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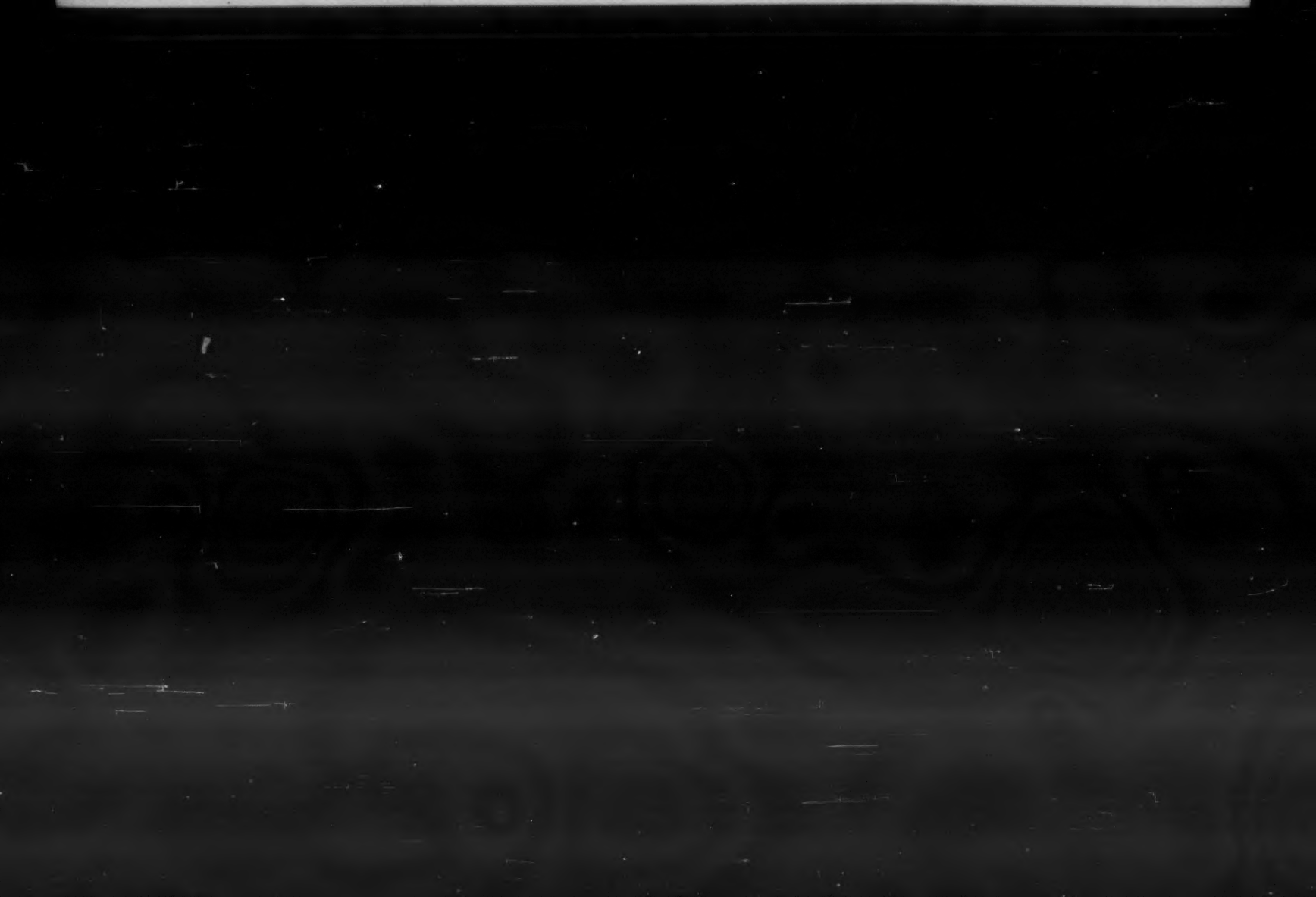

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FUNDAMENTAL PRINCIPLES OF THYROIDECTOMY

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IT IS the purpose of this discussion to demonstrate that a technic for a thyroidectomy based fundamentally on the anatomy involved with proper preliminary control of the main blood supply to the gland, accomplishes the quickest, safest, and most satisfactory results.

Principally through the work of Billroth, Kocher, Halsted, and deQuervain operations on goiter have long since acquired a position among the ordinary procedures of surgery. The operative mortality has now been reduced to less than 1 per cent. In spite of this, and the technical accomplishment of the competent operator, many surgeons even now undertake a thyroidectomy with considerable apprehension. From the very beginning of thyroid surgery, the fear of hemorrhage has been uppermost in the mind of the surgeon. Halsted in his "Operative Story of Goiter" stated "this conspicuous tumor of the neck was a perpetual challenge to the physician and a stigma as well to the surgeon." Because of the generous blood supply of this gland which has been stated to be 100 times as great as that of the brain and 20 times more abundant than that of the kidney, the control of bleeding is still the most important technical problem in thyroidectomy.

It has been observed that many operators will follow no premeditated plan of attack, merely excising goitrous tissue and accomplishing hemostasis as removal of the gland progresses. The operative field is soon filled with hemostats with resulting extra hazard of damage to the recurrent laryngeal nerves. These hemostats in turn are replaced by numerous ligatures which delay healing and increase drainage with a resultant unsightly scar.

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It is reasonable to believe that a planned method of procedure with the preliminary application of ligatures to the main vessels supplying the gland, will prevent hemorrhage and thereby avoid the most serious complications of thyroidectomy, namely, injury to the recurrent laryngeal nerves and damage to the parathyroid bodies. A planned method will also be helpful in obtaining a good functional result, avoiding recurrences, and preventing persistence of hyperthyroidism. A description of the technic with a few illustrations will best emphasize the value of a planned procedure.

The incision for thyroidectomy should be relatively straight. In

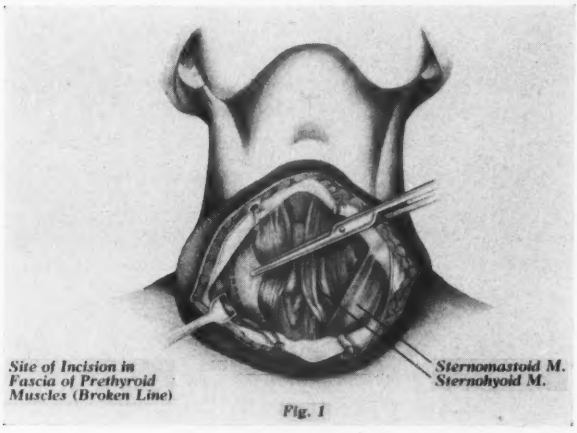

Fig. 1. Exposure for Inferior Thyroid Artery. Median border of the sternomastoid muscle freed and retracted laterally. The exposed fascia of the prethyroid muscle is slit vertically for about 3 cm. The outer edge of the slit fascia is pared back and finger is gently slipped down to the carotid sheath and to the transverse process of the 6th cervical vertebra. The artery is readily felt at this level.

patients with ordinary sized goiters, it should be placed about one finger's breadth above the upper border of the sternal ends of the clavicles. In patients with large goiters, because of the resulting looseness of the skin, the incision should be relatively higher to prevent "dropping" of the scar onto the upper chest. The incision should go down to and through the superficial layer of the deep cervical fascia, thereby including the anterior jugular veins which are dissected back with the anterior flap (fig. 1). After the bleeding in the upper flap has been controlled, the lower margin of the wound is undermined for a distance of about 2 centimeters. This important procedure prevents an "overhanging" of the skin of the

upper flap after the wound has healed. Inclusion of the superficial layer of the deep cervical fascia in the flap has the advantage of preventing ecchymosis of the skin in the thin patient. When the prethyroid muscles have been thus exposed without their fascial investments, they can readily be retracted without cutting.

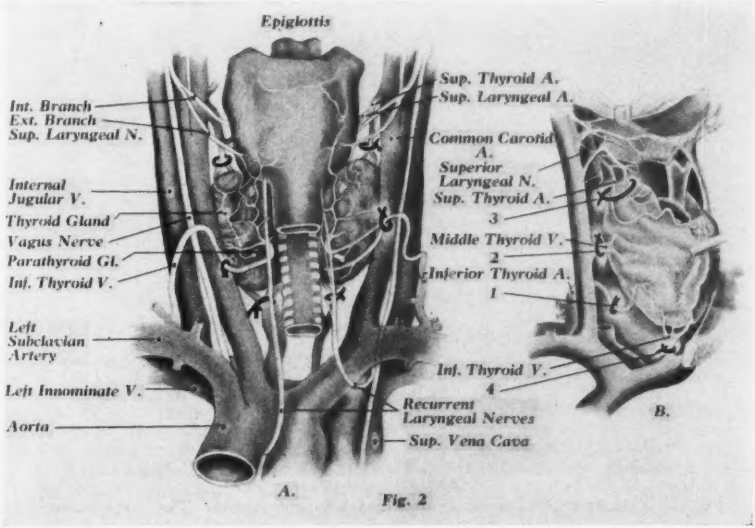

Fig. 2

Fig. 2. Preliminary Hemostasis. Ligatures have been applied to: 1. The inferior thyroid arteries (extrafascially), 2. The median thyroid veins, 3. The superior thyroid arteries and veins, 4. Inferior thyroid veins. The gland can now be resected deliberately with very little bleeding.

The posterior view of the thyroid reveals the advantage of a planned preliminary hemostasis to avoid complications in thyroidectomy. The close relationship of the superior laryngeal nerve to the superior thyroid artery, the course of the recurrent laryngeal nerves as related to the inferior thyroid arteries, and the usual location of the parathyroid glands is clearly shown. It is obvious that a ligature applied to the trunk of the inferior thyroid artery as it emerges from under the carotid sheath will produce complete hemostasis. Attempts to apply forceps to its many branches results in less hemostasis and more possible damage to the recurrent nerve. This nerve enters the larynx at the junction of the cricoid and thyroid cartilage. Attention must be called to the danger of injury to the nerve at this point when ligatures are applied to the posterior branch of the superior thyroid artery. Ultra or polar ligation will avoid this complication. We feel that an attempt to identify the recurrent

laryngeal nerve in all thyroidectomies is unnecessary and that such a procedure would often result in injury to the nerve in the attempt to find it. We do feel that identification of the recurrent nerve is important in the very small glands, and in the attempt to remove recurrent thyroid tissue. In the latter, the nerve often is displaced from its natural position by scar tissue.

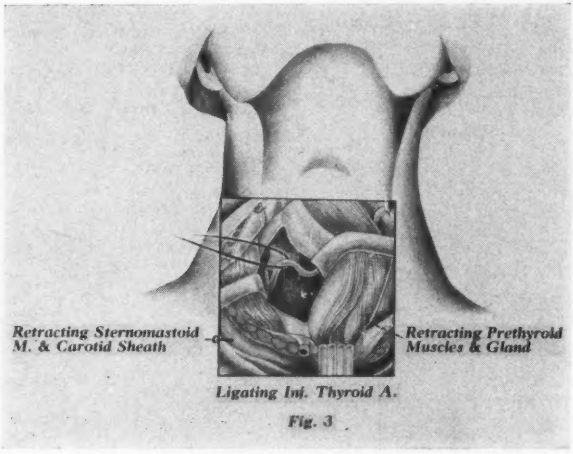

Fig. 3. Extrafascial Ligation of Inferior Thyroid Artery. The sternomastoid muscle, carotid artery, jugular vein and vagus nerve retracted outward. Prethyroid muscles and thyroid mass retracted medially quickly exposes inferior thyroid artery.

Intralaryngeal examination to note the position of the vocal cords should be a routine preoperative procedure. Judd pointed out years ago that about 5 per cent of the patients coming to thyroidectomy have a previously disabled cord. The large goiter, substernal, intrathoracic, and especially the recurrent goiter are more commonly so affected.

The question has often been raised concerning the blood supply of the parathyroid bodies when all four of the thyroid arteries have been ligated. DeQuervain, through his experiments has shown, and our experience has proved, that no damage is done to these structures. The generous collateral circulation established between the internal laryngeal, internal mammary, and transtracheal vessels together with the preservation of the posterior capsule over the trachea leaves an adequate blood supply to the parathyroids.

Recurrent goiter and persistence of hyperthyroidism in the exophthalmic goiter is often due to an inadequate operation. Experience

has shown that there is no criterion to determine the exact amount of tissue to remove or the amount that should be left behind. We have found that neglect in the thorough removal of the pyramidal lobe, and the inadequate removal of the tissue in the region of the superior poles most often accounts for the compensatory hypertrophy and the recurrent hyperplasia of these residual portions of

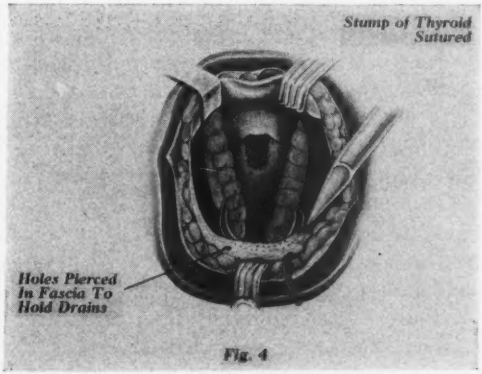

Fig. 4. Completed Resection. Pyramidal lobe is removed completely. Small wedge of residual thyroid tissue in the esophageal tracheal groove automatically protects the recurrent laryngeal nerve. Posterior capsule is shown intact over the trachea. This insures preservation of collateral circulation to supply parathyroid bodies.

unresected tissue, especially in the toxic cases (fig. 4). Careful inspection for and the removal of small adenomata from in front of the capsule in the lower portion of the lobe by sharp dissection, or better with the ring forceps, prevents recurrence in the adenomatous types of goiter.

Since most thyroid carcinoma occurs in nodular goiter; and in view of the relatively small risk of the operative removal of this type of goiter, we feel that it is advisable to recommend the surgical excision of all nodular goiters unless strong contraindications exist. Hinton and Lord found the incidence of carcinoma to be 7.6 per cent in the *clinically* benign nodular goiters, as compared to an incidence of 6.7 per cent of carcinoma in the *clinically* benign breast lesions. We have observed that clinicians have too often used the basal metabolic rate (so important in Grave's disease) as a criterion in determining the need of surgery in all types of goiters. Nodular goiters which are usually unsightly and frequently cause pressure symptoms, often become malignant and should be removed for these reasons, in spite of a normal basal metabolic rate. The symptoms of carcinoma as described in textbooks and literature are those of

far advanced malignancy. When these symptoms are present such as pain, recent rapid growth, a metallic voice, adherence to the surrounding tissues and invasion of adjacent vessels which means the penetration of the capsule, surgical treatment is usually too late.

The advantages of a methodical preliminary application of ligatures to the principal arterial supply is best appreciated in the surgical treatment of the substernal, intrathoracic, and most of all in the very vascular exophthalmic goiter where bleeding is persistent. These are the cases which many surgeons hesitate to operate upon. Preliminary application of ligatures to the inferior thyroid arteries and the superior poles before the veins are interfered with, makes the rest of the operation proceed without difficulty. By this procedure, venous engorgement is prevented and the goiter gives way easily to the pressure of the finger passed beneath the sternum. The position of the inferior thyroid artery is often much higher than normal in the retrosternal goiter because this portion is often developed at the expense of the inferior horn. Prevention of bleeding by ligation to these vessels together with intratracheal anesthesia converts this operation into a safe procedure.

Because of the more recent introduction of "thio drugs" much has been written concerning the treatment of hyperthyroidism. It is not within the scope of this paper to discuss the advantages or disadvantages of these drugs. It is, however, appropriate to quote the conclusions drawn from recent extensive studies by Curtis and Swenson, and also by Lahey and Bartels. McCullagh quoted by Curtis, stated that "the risk of the drug superimposed on the risk of the disease exceeds the mortality rate with treatment of iodine and competent surgery." Curtis further states "it is our opinion that the now well established preoperative management of the patient with hyperthyroidism followed by competent surgery will remain the treatment of choice until an antithyroid drug which will have a risk less than that of the disease is synthesized. Surgery then remains the treatment of choice in the management of the great majority of patients with hyperthyroidism." Lahey states that patients with very mild hyperthyroidism are still prepared with Lugol's solution alone. He feels that antithyroid drugs do have a capacity to produce prolonged remissions of mild hyperthyroidism as does iodine at times, but little hope is held for a permanent remission in patients with severe primary hyperthyroidism with a large gland. He concludes that since the mortality of thyroidectomy is now almost nil, surgical removal after the proper preoperative treatment seems to be the proper choice for hyperthyroidism.

In a small percentage of cases stage operations still have a place

in the surgery of the thyroid in spite of the employment of the antithyroid drugs in the preparation of patients with hyperthyroidism. Ligation of the superior thyroid arteries is a simple, safe, and quick operation, which is followed by a marked reduction of the basal

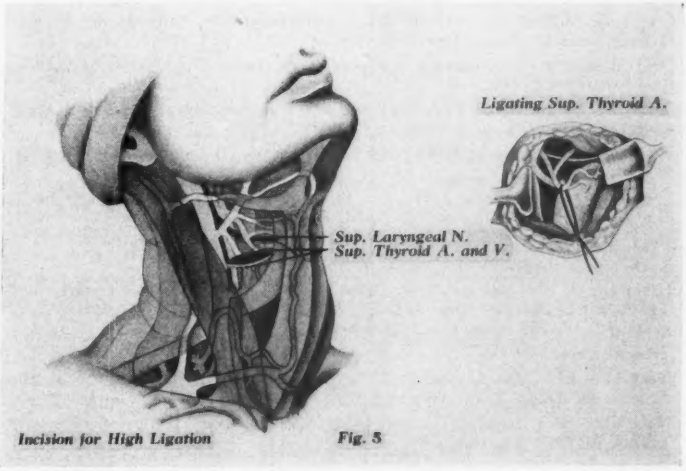

Fig. 5. Ligation of Superior Thyroid Artery. Incision 4 cm. long in the skin crease opposite cricoid cartilage. Superior thyroid artery is seen lying on the inferior constrictor of the pharynx.

metabolic rate, as well as the pulse rate (fig. 5). It is a very good procedure in treating hyperthyroidism in children and young adults, and is a good barometer in these individuals as to their tolerance for a later resection.

Summary

Surgery of the thyroid is very safe, and technical complications can usually be avoided with a technic aimed mainly at hemostasis. Proper hemostasis makes possible a faster, neater, cleaner, and more practical operation, offering better protection to the laryngeal nerves and parathyroid bodies. The great justification for the preliminary application of a ligature to the inferior thyroid artery is the simplicity and speed with which it is accomplished. It has been shown by deQuervain and others that the inferior thyroid artery is uniformly larger by one-third than the superior thyroid artery in both normal and disturbed glands. It has further been demonstrated experimentally by Pettenkofer, Enderlin, and Hotz that the blood supply of the parathyroid is not interfered with, even after the ligation of all four thyroid arteries at their points of origin.

Proper hemostasis prevents postoperative hemorrhage, makes possible a more rapid convalescence, a more permanent cure with much less drainage, and as a result, a better scar.

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PALLIATIVE OPERATIONS FOR CARCINOMA OF THE PANCREAS

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PRELUDE

It has been twelve years since the passing of our colleague and fellow member, to whose memory this address is dedicated. I still miss Jeff Miller. Indeed, he will not soon be forgotten. Those of us who knew him well will continue to remember him as a true Southern gentleman, loved for his gracious and kindly manner, as a scholar and teacher of the first rank, and as a distinguished exponent of the surgical art. His life, both personal and professional, blessed his generation and generations to come as few lives have done. It is well that we hold him close in our hearts at each annual meeting of The Southeastern Surgical Congress, which he so capably served as President. I am deeply and proudly conscious of the privilege of speaking to you on this occasion in honor of our late, revered friend, Dr. C. Jeff Miller.

DURING the past several years, since radical surgery has been employed for malignancies of the pancreas, articles dealing with side-tracking operations in the treatment of pancreatic lesions have been conspicuous by their absence in the literature. One receives the impression that, in their eagerness to develop a new treatment, surgeons are prone to overlook the virtues of less radical measures.

The desirability of removing a malignancy in any location, when this is feasible and consistent with a reasonable degree of safety, cannot be questioned. It is true that operations upon the stomach, colon and other structures, which 40 years ago seemed forbidden or were unheard of, are now universally performed, and with an astonishingly low mortality. The use of new therapeutic agents, and the development of new surgical materials and better methods of anesthesia have permitted us to penetrate new spheres with comparative impunity. These same adjuncts to treatment are now being applied in radical operations upon the pancreas for malignancy, but, thus far, with considerably less success. There are a number of reasons for this, the main one being that surgery for malignant disease of the pancreas involves several problems which are not encountered in the surgical treatment of similar lesions elsewhere.

In the *first* place, the definite diagnosis of a carcinoma of the pancreas is often difficult, even at operation. The tumors are frequently

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so deeply situated in the pancreatic tissue that biopsy is impossible without risk of severance of the duct and major blood vessels. In the presence of diffuse lesions, especially, one may be unable to distinguish with certainty between cancer and pancreatitis, and must await the outcome to settle the issue. In such cases, the risk of resection of a benign lesion is not to be ignored.

In the *second* place, these patients are, on the whole, elderly individuals, and are poor surgical risks because of the obstruction of the bile flow and consequent cholemia and other systemic and organic disturbances incident to the disease process. Further, the operation of radical resection of the pancreas is a prolonged, complicated procedure, and, despite massive blood transfusions and other measures, is shocking in the extreme, particularly to debilitated patients.

In the *third* place, the technical difficulties of resection are numerous, and postoperative pancreatic or biliary fistula, hemorrhage, leakage and peritonitis, and ascending infection are serious possibilities. The fact that almost every surgeon who has done a number of these operations has described a different technic is proof that a satisfactory one is yet to be developed.

In view of these facts, it is small wonder that this operation, wherein not only the pancreas is partially or wholly resected, but often the duodenum and a part of the stomach, as well as other organs, involves a mortality of from 20 to 50 per cent or more. Waugh and Clagett[10] report an operative mortality of 20 per cent in 30 radical resections of the head of the pancreas. Whipple[11] has had a mortality of 38 per cent for two-stage resections and of 31 per cent for one-stage operations. Orr[7] collected a group of combined resections of the pancreas and duodenum wherein the mortality rate was 28 per cent for two-stage operations and 32.6 per cent for one-stage procedures. He also reports 9 pancreaticoduodenectomies performed at the University of Kansas Hospitals, which carried a mortality of 22.2 per cent.[8] Bartlett[1] reported a mortality of 45 per cent following one-stage resections and 29 per cent following the two-stage method.

The physiologic effects of pancreatic resection, especially the impairment of protein, carbohydrate and fat metabolism, insulin deficiency and anemia, are matters of major concern. Methods of technic and special drugs are now being employed which remove some of the unfavorable sequelae in more or less degree, though these are still largely in the experimental stage.

Finally, one may well question whether the postresection survival period is sufficiently prolonged as compared to the survival

period following short-circuiting operations to justify the more radical procedure. Bartlett reports an average survival of 7 months of 16 patients who were treated by resection, and an average of 5 months of 18 patients who had a palliative operation. In a group of cases collected by Whipple,[11] the length of life after resection was 9.3 months. Orr[7] later collected a group wherein the average survival following resection was 9.9 months, and reported his own cases to that time, wherein the average survival was 15 months. These figures do not differ materially from the survival figures following side-tracking operations reported by 7 authors whom Orr quotes. He makes the statement himself that, "The data available are not very convincing that pancreaticoduodenectomy is superior to less radical measures." Erb[4] expresses the opinion that permanent cure of carcinoma of the head of the pancreas will follow successful resections only rarely.

We have dwelt at length upon this problem of pancreatectomy, feeling that it is well once again to call attention to the fact that, in view of the possibility of error in diagnosis, the magnitude of the operation with its attendant shock and high mortality, the physiologic disturbances which follow, and the small number of 3 to 5 year cures which have thus far been reported, side-tracking operations are still our best recourse in the treatment of the vast majority of malignancies of the pancreas.

Diagnosis. Regardless of technical and therapeutic developments, the surest means of improving the mortality rate and increasing the number of long term survivals of pancreatic resection lies in earlier diagnosis. Here, again, we are confronted with the fact that the early diagnosis of cancer of the pancreas offers more difficulty than that of similar lesions in other locations.

We have come to think of carcinoma of the pancreas as a disease characterized by painless jaundice. Experience has shown that, in a large number of cases, it is neither painless nor manifested by jaundice. Both pain and jaundice are prone to appear fairly early in association with obstruction of the bile ducts. If the lesion is in the body or tail of the pancreas, however, jaundice may not appear until quite late in the course of the disease, if at all. Brunschwig[2] has observed that in most cases of carcinoma of the body of the pancreas, pain is the initial symptom.

Fortunately, both pain and jaundice are usually preceded by a prodromal period lasting at least a few months, wherein the patient is troubled with vague epigastric fullness and distress, nausea and vomiting, and loss of appetite, weight and strength. A striking feature of these early symptoms is their constancy. Often they are

sufficiently severe to bring the patient to a physician, and should at once suggest a malignancy. Even so, the diagnosis may be full of pitfalls, and the real issue may be easily overlooked unless an exhaustive survey is made. This point was brought out in the case of a patient who came under our care just a few weeks ago.

The patient, a woman 72 years of age, had consulted an internist elsewhere for symptoms of epigastric distress, nausea, and loss of weight and strength. The internist referred her to a roentgenologist, who made a study of the stomach and intestinal tract. During this examination, he discovered a shadow in the region of the right kidney, which apparently was that of a cyst. Believing this was probably the source of her symptoms, the roentgenographic study was carried no further, and the patient was referred to a urologist for removal of the cyst. She came under our care a few days after her dismissal from the hospital following the operation. At that time, she was moderately jaundiced, and on being questioned, reported that her digestive symptoms had begun more than a year previously and had gradually become more severe. Recently, she had been troubled with pruritus. Examination revealed a large, firm, fixed mass in the right epigastrium and a greatly distended gallbladder. On exploration, a carcinoma the size of a lemon was found in the head of the pancreas.

The point of this case is, obviously, that the search for the cause of the patient's complaint was abandoned on the finding of the cyst of the kidney. Had the gallbladder been visualized and the examination pursued further, her primary disease would probably have been promptly discovered.

Some difficulty may be encountered in distinguishing the jaundice of pancreatic carcinoma from that of other lesions which obstruct the bile ducts. As a rule, the jaundice of a pancreatic lesion develops rapidly, soon becoming pronounced, and is associated with a severe pruritus, a high icterus index, and often an enlarged gallbladder and liver. Moreover, the jaundice is constant rather than intermittent, and chills and fever are conspicuously lacking.

Reports as to the incidence of pain in carcinoma of the pancreas differ widely, probably because this symptom varies so widely in degree. Some patients complain of only a dull ache in the epigastrium, while others describe a deep, boring pain extending through to the back, and still others have a cramping or colicky pain. In some patients, the pain extends into the abdomen, and in others it radiates to the left. Left-sided pain indicates, usually, a tumor in the tail of the pancreas. In the majority of cases, pain, like jaundice, is continuous. Of Crile's[3] patients, 36 per cent complained of severe pain. Orr[8] reported that over 75 per cent of patients with carcinoma of the ampulla and head of the pancreas had pain. Fifty-eight per cent of our patients described pain of one type or another.

The presence of a colicky pain at once suggests gallbladder disease. On finding a diseased gallbladder, however, one should not overlook the possibility of a pancreatic lesion. The manifestations of cholecystitis and carcinoma of the pancreas are so similar that any suggestion of the latter should be thoroughly investigated.

In the presence of jaundice, we rely to a considerable extent upon the finding of an enlarged gallbladder as a diagnostic feature of pancreatic carcinoma, yet failure to palpate the gallbladder is no indication that the pancreas is not diseased. Prolonged obstruction of the duct usually produces an enlargement of the liver and, at times, the enlarged liver may overhang a distended gallbladder, preventing palpation of the latter. If the lesion is in the body or tail of the pancreas, an enlargement of the gallbladder is the exception, rather than the rule.

Laboratory studies are, on the whole, of little value in the diagnosis of cancer of the pancreas. Lipase and serum amylase tests may be useful in ruling out acute pancreatitis. Roentgenograms may throw some light upon the problem, in that the demonstration of a displacement of the stomach or a deformity of the duodenum would suggest a malignancy of the pancreas. They may also serve to rule out cholecystitis with stones and a stricture or tumor of the ducts, though as a positive diagnostic measure, roentgenograms are by no means adequate. Duodenal drainage is of value only if bile fails to return through the tube, in this event indicating complete obstruction of the ducts.

We have observed several patients who, from the clinical picture and the gross appearance of the lesion, we believed almost certainly had a carcinoma; in the course of time, however, this diagnosis was changed to one of pancreatitis.

A typical case was that of a man, aged 68, who consulted us in December, 1943. He complained of gastric distress, some pain in the right upper quadrant, poor appetite, weight loss and gradually increasing jaundice. He was not severely jaundiced, however, and did not otherwise exhibit evidence of an advanced lesion. There was only a suggestion of a mass in the right upper abdominal quadrant. On exploration, the gallbladder was distended and of the cholesterosis type, probably accounting for his pain. The liver appeared normal. There was a firm mass the size of a lemon in the head of the pancreas and, although the remainder of the organ was firm to a lesser degree, the lesion was considered almost certainly malignant. A cholecystojejunostomy was performed, and now, 3 years later, the patient is still well and active. From his clinical progress, we realize that he had a cholecystitis and pancreatitis, and the short-circuiting operation has apparently effected a cure.

As in this case, approximately 15 per cent of all suspected carcinomas of the pancreas prove benign.[9]

TABLE I.

Sex Incidence in 81 Cases of Carcinoma of the Pancreas

Males	56
Females	25

Our experience with carcinoma of the pancreas comprises 81 cases. Fifty-six of the patients were males and 25 were females (Table I). Their ages ranged from 39 (2 patients) to 78 years, the average being 60. The duration of symptoms ranged from one week to 25 years, though only 14 patients reported symptoms of more than one year's duration.

TABLE II.

Symptoms in 81 Cases of Carcinoma of the Pancreas

Jaundice	63
Pain	47
Palpable mass	42

In this series, jaundice was the outstanding physical sign of the disease, being present in 63 patients (Table II). All those who had a lesion in the head of the pancreas were jaundiced, and this sign alone brought several of the patients for examination.

Forty-seven patients complained of pain. The vast majority of these described either a dull, more or less constant ache in the right epigastrium and beneath the shoulder blade, whereas a few had a colicky type of pain. Associated gallbladder disease may have been responsible for pain reported by 9 others.

A palpable mass was found in 42, or 52 per cent, of this group. In a few cases, we were unable to determine whether the mass was an enlarged gallbladder or a tumor of the pancreas. At operation, the gallbladder was found distended incident to the pancreatic lesion in 39, and the liver was enlarged in 19.

TABLE III.

Surgical Treatment in 81 Cases of Carcinoma of the Pancreas

Side-tracking operations	50
Exploration	17
No operation	14

In 14 of the 81 patients, the disease was believed too far advanced for exploration, 17 had exploration alone, while 50 had some type of palliative operation (Table III).

Of the 67 patients who had exploration alone or with a side-tracking operation, 48 (72 per cent) had a carcinoma of the head of the pancreas, 9 (13 per cent) had a lesion in the body or tail, or both, and in 10 (15 per cent) the growth was diffuse. This preponderance of lesions in the head has been reported by a number of authors. Leven[6] collected 678 cases from the literature, wherein the tumor was in the head in 56.3 per cent, was diffuse in 30.7 per cent, was in the tail alone in 6.6 per cent, and in the body alone in 6.3 per cent. Of 56 cases observed by Zollinger and Kevorkian,[12] the lesion was in the head in 49 and in the body or tail in 7.

In the majority of our cases, a biopsy of the tumor was impossible or unnecessary; the diagnosis was based upon the classical symptoms and signs and, at operation, the discovery of a firm mass. When the question of malignancy was doubtful, the diagnosis was confirmed by the early demise of the patient. With few exceptions, the patient who had only an exploration had liver metastases.

TABLE IV.

Operations and Mortality in 50 Cases of Carcinoma of the Pancreas

Operations	*Number*	*Mortality*
Cholecystojejunostomy	22	2 (9%)
Cholecystogastrostomy	19	2 (9.5%)
Choledochoduodenostomy	6	0
Miscellaneous	3	0
TOTALS	50	4 (8%)

Cholecystojejunostomy was performed in 22 cases, cholecystogastrostomy in 19, and choledochoduodenostomy in 6 (Table IV). Our choice of the procedure was based to some extent upon the findings, but was often chosen for simplicity and ease of execution. Since 1937, we have been employing cholecystojejunostomy almost exclusively in these cases. This procedure is preferable to cholecystogastrostomy in that, by the latter, the stomach contents are likely to enter the biliary tract and give rise to cholangitis. Moreover, the thin wall of the distended gallbladder provides a poor structure for anastomosis with the thick wall of the stomach in the prepyloric region.[5] In addition, the technic of cholecystogastrostomy is often difficult and the operation may thus be prolonged. Cholecystojejunostomy, on the other hand, is not only a simple and easily executed procedure, but obviates almost entirely the danger of leakage. It is our custom to bring the jejunum up over the colon at the hepatic flexure. After the gallbladder is emptied, both structures may be elevated into the incision and the anastomosis readily accomplished. The bile is freely discharged into the intestinal tract

at this low level, and the danger of ascending infection is minimized. If the jejunal loop is necessarily short and obstruction seems likely, a supplementary enteroenterostomy may be performed.

In this series, a choledochoduodenostomy was employed only in those cases wherein the gallbladder was so diseased as to require removal, or had already been removed.

An essential type of any anastomosis of the biliary tree is the creation of a large stoma. This measure affords the best guarantee of free drainage of bile and the best protection against recurrent cholangitis or a fatal infectious hepatitis. A careful review of our cases shows that ascending infection has been a rare complication, and in no case has been of more than mild degree. We attribute this to our practice of making anastomoses as wide as possible.

Mortality. Recent figures on the mortality of palliative operations are scant, in that few reports are available in the literature. Our total mortality has been 8 per cent. Prior to 1940, our mortality was 15.4 per cent. The majority of operations performed during that period were cholecystogastrostomies. Since the beginning of 1940, our operative mortality has been 5.4 per cent. We believe this lower figure is due largely to the fact that we have employed cholecystojejunostomy and choledochoduodenostomy almost entirely during the later period. The mortality rates for the respective procedures are shown in Table IV.

The duration of life of the 46 patients who recovered following a short-circuiting operation but have since died was from 25 days to 2½ years. One patient died of a heart attack shortly after leaving the hospital. Three of the patients could not be traced. Nine are still living. The average survival of the remaining 30 was 7 months. Three lived more than 2 years.

One of the patients who had a palliative operation had an unusual history.

He had come to us 8 years previously, at that time being 44 years of age, giving a history of epigastric pain and digestive disturbance of 3 years' duration. At operation, a carcinoma involving the body and tail of the pancreas was found. The mass was approximately 6 inches long, 5 inches wide and 2½ inches in thickness. It extended up along the superior mesentery artery well behind the stomach, and down beneath the mesentery of the small bowel below the umbilicus, on the left to the splenic flexure of the colon, and on the right beyond the midline. It was densely fixed to the mesentery of the colon anteriorly and to the other structures posteriorly. Pathologic study of a specimen from the middle of the lesion showed it to be a scirrhous type of carcinoma. There was no evidence of metastases. It was impossible to remove the growth because of its attachment to important blood vessels. Since there was no obstruction of the duct, the operation was concluded as an exploration.

Incidentally, the patient returned 3 months later because of an enlarged gland in the groin. Frozen section diagnosis of the excised gland was lymphosarcoma. Other enlarged glands appeared from time to time in the neck, axilla and groins, and were treated with x-ray therapy. This condition was probably not related to the pancreatic disease, but was interesting on account of the association.

On the whole, the patient continued to do well and was able to carry on his work for the next 6 or more years. His abdominal symptoms grew worse and he returned for further treatment. On exploration, the mass involved not only the pancreas, but also the omentum and more than half the greater curvature of the stomach. There were numerous masses throughout the abdomen. Since the distal portion of the duodenum was obstructed, an anastomosis was made between the duodenum above the obstruction and the jejunum. The patient lived three months thereafter. Although a survival of 8 years is exceptional, we feel that this case is worthy of description.

By way of comparison from the standpoint of postoperative survivals, we have reviewed the cases of our 17 patients who had only an exploration. Five (30 per cent) of these died in the hospital. One is still living 2 months after operation. One could not be traced. The remainder lived one to 6 months, the average being 4 months. If the patient who lived for 8 years is included among the group who had only an exploration, the average duration of life is increased to 11 months.

The symptomatic relief obtained following side-tracking operations is often excellent. Once the flow of bile is returned to the intestine, the itching subsides, the jaundice clears, and but little digestive disturbance is experienced. The patients are not troubled with fatty liver, nor with the necessity for taking insulin, pancreatin or anti-anemic therapy. On the whole, they have a good appetite, gain strength, feel comparatively well and enjoy life for a while.

At present, radical resection for carcinoma of the pancreas has little advantage over short-circuiting operations, insofar as longevity is concerned. Further, because of its technical difficulty and high mortality, resection is a procedure for only the experienced surgeon. Short-circuiting operations, on the other hand, are technically simple and carry a relatively low mortality rate. Cholecystojejunostomy, in particular, may be easily and quickly executed by anyone who is familiar with intestinal anastomosis. As stated in the beginning, it is of course eminently desirable that malignancies of the pancreas, like those in any other location, be removed when this is at all feasible, and efforts to improve the technic of resection should receive constant encouragement. The purpose of this paper is to call attention to the fact that, until we succeed in bringing these patients to surgery early, palliative operations will continue to have a wide field of usefulness in the treatment of carcinoma of the pancreas

and, because of their simplicity, may be undertaken by the average surgeon with comparative safety.

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NEEDLE BIOPSY OF THE LIVER IN THE DIAGNOSIS OF "SURGICAL" JAUNDICE

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IN THE majority of patients with jaundice the mechanism of the jaundice can be diagnosed with little difficulty. There are certain cases, however, in which thorough clinical, chemical, and radiologic investigations may fail to clarify the underlying mechanism or to point out the rational treatment. In such cases the surgeon is faced with a difficult decision: does the patient have extrahepatic obstruction due to stone, tumor, or scar tissue, which demands prompt surgical intervention, or is the obstruction intrahepatic, such as that produced by the various forms of hepatitis, in which surgery is not only useless, but quite possibly harmful? It has been our experience that histologic examination of tissue obtained from the liver by needle biopsy has proved definitely helpful in reaching a decision between intrahepatic and extrahepatic obstruction.

Needle biopsy of the liver has been employed for over fifty years, but only in the last decade has the procedure been used in this country to any considerable extent. Important information has been obtained. The pathologic changes of epidemic hepatitis have been worked out, especially for the stages for which no postmortem material was available. The transition of hepatitis to cirrhosis has been confirmed. The early diagnosis of cirrhosis has been facilitated; likewise the diagnosis of primary and secondary tumors of the liver.

Numerous series of liver biopsies have been reported,[1] and some investigators have performed the procedure several hundred times. In general, the reports have been concerned with many different types of liver disorder and have not particularly stressed the differential diagnosis of jaundice.[2,3,4]

Our series, comprising 70 liver biopsies, is comparatively small. At first, biopsies were done for the sake of standardization of histologic pictures on a number of patients with liver disease, liver enlargement or impaired liver function, since we felt that special experience with liver biopsy on the part of the pathologist was nec-

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essary to the accurate interpretation of sections from a small cylinder of tissue. This is particularly true in jaundice. More recently, the procedure has been employed only in patients with diagnostic liver problems.

Early in our series, a biopsy was taken from a patient who on clinical grounds was diagnosed as hepatitis. The section, however, was interpreted as obstructive jaundice and this was confirmed at operation. Following this, Dr. R. J. Wilkinson instigated needle biopsies on a number of his patients with jaundice; he has provided much material and encouragement for this study.

In order to be practical and rational, the procedure of needle biopsy of the liver should be at least as simple and at least as safe as surgical exploration. We believe that the procedure meets these requirements. It is a bedside procedure which can be performed in five minutes. Several different approaches to the liver and various types of needles have been described.[1] We have used exclusively the lateral intercostal approach with the "Vim"-Silverman[5] needle. With the patient supine, the center of the liver dullness in the midaxillary line is determined by percussion and this point is marked. Then under aseptic technic the skin tissues down to the liver are anesthetized. The skin is then nicked and the Silverman needle is introduced at right angles to the trunk. The patient is instructed to hyperventilate briefly, and holds his breath while the biopsy is being performed. The needle traverses the diaphragm and occasionally the lowermost portion of the right pleural space, and enters the right lobe of the liver to a depth of 2 to 4 cm. The specimen obtained is in the form of a slender cylinder measuring about 15 by 1.5 mm.

We believe that this approach is safer than the anterior approach in which the instrument is introduced below the costal margin. With the lateral approach the needle enters the liver in such a way as to avoid not only the hollow viscera and large abdominal vessels but even the larger hepatic veins. Furthermore, it is not necessary that the liver be greatly enlarged below the costal margin, as the tissue is obtained from near the dome of the liver.

The most serious hazard is hemorrhage. Injury to hollow viscera is hardly possible by the lateral approach. If there is any abnormality of the clotting mechanism needle biopsy should not be attempted. It is imperative, therefore, that bleeding time, coagulation time, and prothrombin time be determined in every case. Normally, bleeding from the surface of the liver after puncture is scanty and of short duration. Direct observation during laparotomy[3] or peritoneoscopy[1] has shown that the blood loss approximates 5 to 20 c.c.

and that bleeding stops within one minute. With the lateral approach it is possible that the diaphragm exerts a hemostatic effect by its direct contact with the needle wound in the liver capsule. Furthermore, there is little likelihood of injuring a large artery or vein, as the vessels are relatively small in the portion of the liver traversed by the needle. In several of our patients who had had biopsies shortly before death, the site of the liver puncture was investigated at autopsy. Even after as little as 2 days the stab wound in the liver was barely visible.

However, fatalities have been reported, nearly all of them due to hemorrhage. The overall mortality of the procedure is approximately 0.6 per cent (12 deaths in 1,978 biopsies collected from

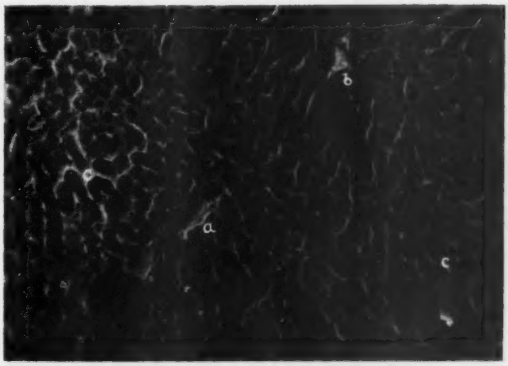

Fig. 1. Section from needle biopsy of normal liver showing *a*, central vein, *b*, periportal field, *c*, blood capillaries.

the literature).[1,3,4,6] In only one of our cases was there a considerable hemorrhage. This amounted to about 200 c.c. and was not considered to be the cause of death. This patient had fulminant Weil's disease which was not diagnosed antemortem. At the time of biopsy, two hours before death, he was delirious, completely uncooperative, and appeared moribund. In addition the presence of cutaneous purpura indicated a bleeding tendency. The prothrombin time was normal, but the bleeding and clotting time had not been determined. Obviously biopsy was doubly contraindicated in a delirious patient with a bleeding tendency.

Pain after biopsy occurred in about one third of our patients, but was rarely severe enough to require analgesics and never lasted longer than 2 days. It may be localized to the region of the puncture, but more frequently is referred to the right shoulder and neck due to irritation of the diaphragm.

In a good section of a liver biopsy (fig. 1) it is possible to identify

liver lobules, central veins, and periportal fields. In normal liver tissue the radial structure of the liver-cell cords and the intervening blood capillaries is apparent. Normally the bile capillaries, which lie between the liver cells, are too small to be seen. At the margin of the liver lobules appear the periportal fields, each with bile duct, hepatic artery, and portal vein branch. The diameter of the liver lobule is about 1 mm., which is approximately the diameter of the needle biopsy section. Thus, it is usually possible to see fairly complete liver lobules with intervening periportal fields.

The histologic differentiation of extrahepatic block from hepatitis is based on microscopic details which are fundamentally simple though in later stages they may become complicated. Essentially, in obstructive jaundice the changes depend primarily upon stasis in the biliary tree and the hepatocellular parenchyma tends to be spared; whereas hepatitis is a diffuse change tending to involve all components of the liver.

When the common duct is blocked, the bile ducts become enlarged and filled with inspissated bile. Ordinarily the histotechnical process extracts most of the bile pigment, but inspissated bile remains as so-called bile thrombi, and retains in the section the characteristic greenish-yellow color. Not only are the bile ducts enlarged, but the bile capillaries between the liver cells, normally almost invisible, become dilated and prominent. Sometimes they show bile thrombi which may exhibit staghorn-like branching. The radial structure of the liver lobule, however, is preserved.

The liver biopsy of a 32 year old woman with jaundice of 2½ weeks' duration is shown in Figures 2 and 3. The history and the

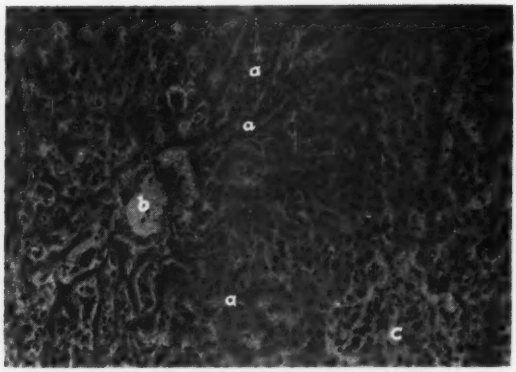

Fig. 2. Early extrahepatic obstruction: *a*, enlarged bile capillaries with bile thrombi, *b*, central vein, *c*, periportal field. Note preservation of radial structure of liver-cell cords.

age of the patient suggested hepatitis, and the physical and laboratory data were equivocal. In this situation one would be tempted to wait for the traditional 4 to 6 weeks of jaundice before exploration,

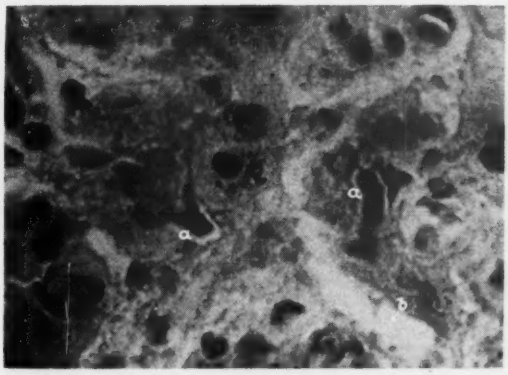

Fig. 3. High-power detail from same case as fig. 2, showing *a*, dilated bile capillaries with bile thrombi, *b*, blood capillary.

but on the basis of the biopsy she was explored promptly. The common duct was found to be obstructed by carcinoma of the head of the pancreas.

If the obstruction is complete and persists for some time the liver cells may become atrophic due to pressure of the dilated bile capillaries. The radial structure of the lobule is still undisturbed. The periportal field increases in size due to connective tissue proliferation and round cell infiltration. Later, small bile duct sprouts are formed and some regenerating liver cells appear. Bile ducts may become compressed by inflammatory infiltration, especially if infection be present in the lower biliary tract. In this case a true pericholangitis, with infiltration of the periportal field with polymorphonuclear leukocytes, may develop. Even then the inflammation tends to be limited to the periportal fields and does not invade the lobule until very late.

In Figures 4 and 5 are details of a liver biopsy section from a 54 year old woman who had had painless, fluctuating jaundice for a period of 12 weeks. She had been treated elsewhere for hepatitis. The laboratory data indicated extrahepatic block. The needle biopsy was reported as obstructive jaundice with pericholangitis. Operation revealed empyema of the gallbladder, cholelithiasis, and a stone impacted in the common duct.

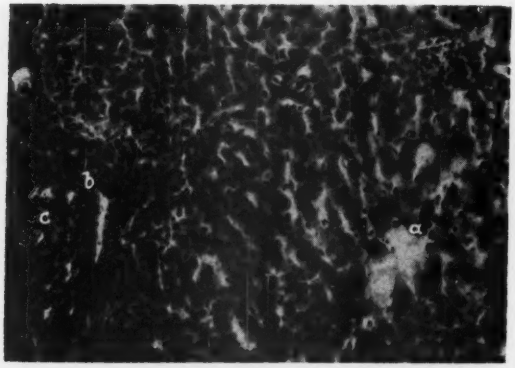

Fig. 4. Longstanding extrahepatic obstruction: *a*, central vein, *b*, enlarged periportal field with pericholangitis, *c*, enlarged bile duct. Note preservation of radial structure of liver-cell cords.

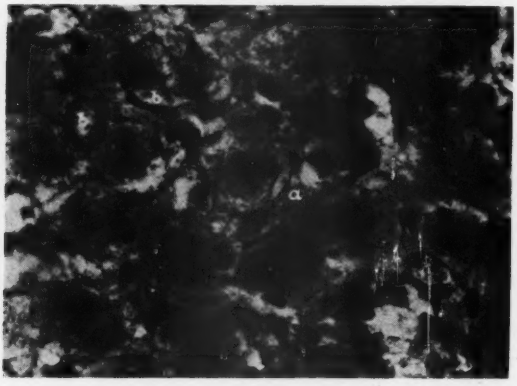

Fig. 5. High-power detail from same case as fig. 4, showing *a*, enlarged bile capillary, *b*, bile thrombi.

Sections from epidemic hepatitis or from homologous serum hepatitis typically show diffuse infiltration of all portions of the liver with inflammatory cells. The inflammation may be more pronounced in the periportal fields, but in contrast to extrahepatic block there is always involvement of the entire lobule. The radial structure of the lobule is not only blurred by the exudate but is actually disorganized, with kinking and disruption of the liver cell cords. The cells are seen in various stages of degeneration and necrosis.

Figures 6 and 7 are photomicrographs from a young woman dying of fulminant serum hepatitis. Three months previously she

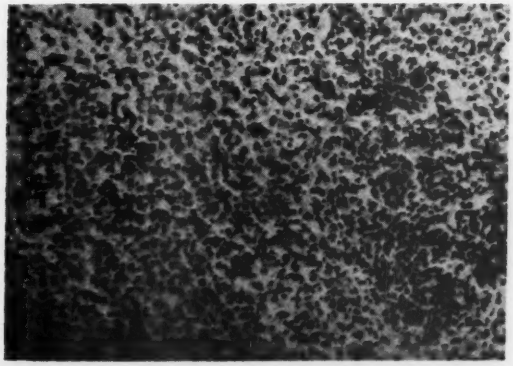

Fig. 6. Severe diffuse hepatitis, showing complete loss of architecture and dense infiltration of entire liver lobule with inflammatory cells.

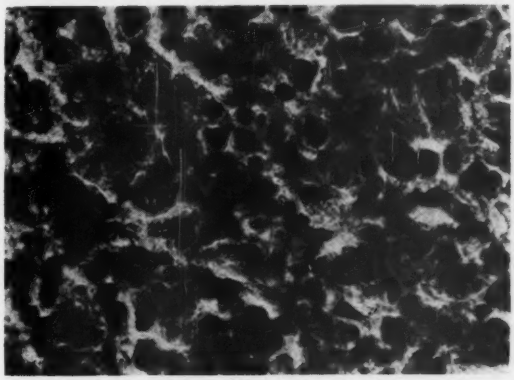

Fig. 7. High-power detail from same case as fig. 6.

had received several transfusions of whole blood and 2 units of Red Cross plasma in connection with extensive small bowel surgery. Similar cases have been reported following surgery on the biliary tract. In such cases the diagnostic dilemma of serum hepatitis versus postoperative stricture of the common duct may be definitely resolved by needle biopsy.

In protracted cases of hepatitis, in which many liver cells have been destroyed, the periportal fields become greatly increased in size and densely infiltrated by inflammatory cells. As in longstanding obstructive jaundice, bile duct sprouts appear. Due to the great destruction of the parenchyma, regeneration of the liver cells is much more pronounced than in extrahepatic block. Regenerating liver cells appear in clusters. They are large cells with large dark,

sometimes multiple nuclei. The liver lobule continues to show disruption of its structure and inflammatory infiltration, with very few, if any, bile thrombi. This stage may represent the beginning of cirrhosis.

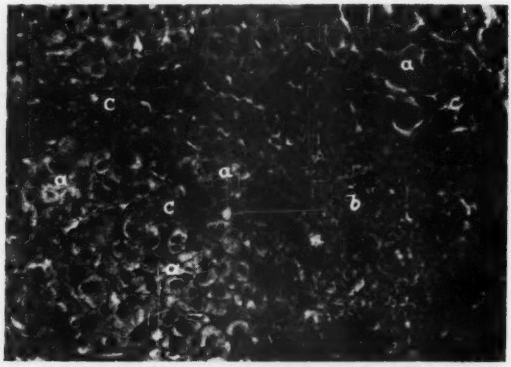

Fig. 8. Longstanding hepatitis: *a*, clusters of regenerating liver cells, *b*, enlarged periportal field, *c*, diffuse infiltration of lobule with inflammatory cells. Note absence of radial structure of liver cells.

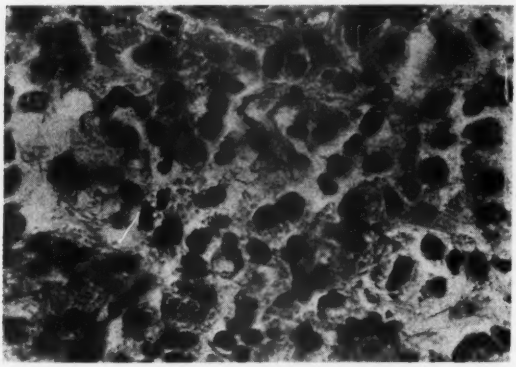

Fig. 9. High-power detail from same case as fig. 8.

In figures 8, 9, and 10 are histologic details of a liver biopsy from a 40 year old man who had fluctuating painless jaundice over a period of 3 months. Without biopsy, he would certainly have been subjected to needless and possibly harmful exploration. Two biopsies taken 6 weeks apart showed the picture of a severe, diffuse, chronic hepatitis, probably with beginning cirrhosis.

From the histologic criteria we believe that the diagnosis of

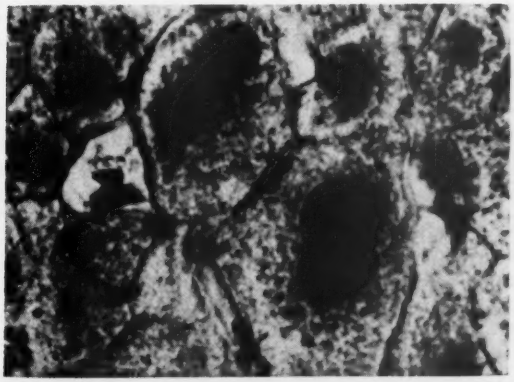

Fig. 10. High-power detail from a case of hepatitis, showing large multinucleated regenerating liver cells.

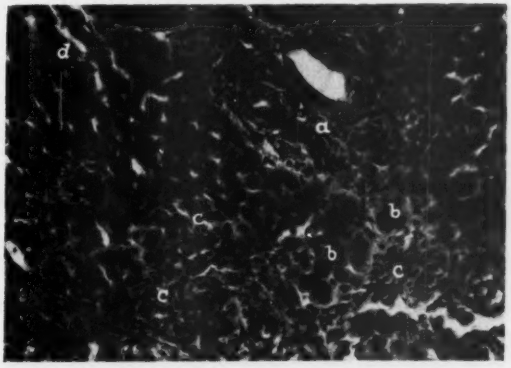

Fig. 11. Extrahepatic obstruction of long standing simulating hepatitis: *a*, enlarged periportal field with pericholangitis, *b*, islands of regenerating liver cells, *c*, diffuse inflammatory infiltration, *d*, focal preservation of radially disposed liver-cell cords.

extrahepatic obstruction can be made with certainty if biopsy is taken within the first 2 or 3 weeks after the onset of jaundice. After this time, an occasional case may show a histologic picture in the biopsy section which is extremely difficult to differentiate from long-standing hepatitis. A pericholangitis accompanying extrahepatic obstruction may after several weeks involve the hepatocellular elements, imitating the lesion of primary hepatitis. However, in the great majority of cases the clear-cut picture of mechanical obstruction is still preserved so that the diagnosis of extrahepatic block may be confidently made even after several months of jaundice. One patient in our series was incorrectly diagnosed as hepatitis on the

basis of a biopsy taken in the 6th week of jaundice (fig. 11). Subsequent exploration revealed obstruction of the common duct by carcinoma of the head of the pancreas.

We have performed 20 liver biopsies on 16 patients with jaundice in whom reasonable doubt existed as to the mechanism of the jaundice. As shown by subsequent clinical course, surgical findings or autopsy, the correct diagnosis was made from the biopsy in 15 of the 16 cases. Eight cases were diagnosed correctly as non-surgical and 7 as surgical.

Conclusions

(1) Histologic criteria for the differentiation of extrahepatic obstruction from hepatitis in needle biopsy specimens of the liver have been presented.

(2) Needle biopsy of the liver is a valuable aid in the differential diagnosis of jaundice, especially when performed early in the course of jaundice.

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SUBCAPSULAR NEPHRECTOMY—ITS INDICATIONS AND ADVANTAGES

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THE purpose of this paper is to call attention to the advantages of a well established procedure, subcapsular nephrectomy, which we think is indicated in certain pathologic conditions of the kidney. It is well known that in the performance of a nephrectomy, the greatest difficulty is encountered in those kidneys upon which previous surgical procedures have been done or in those harboring infection over long periods of time, in which perinephritis of considerable degree develops, resulting in fixation of the kidney to adjacent structures. These are the two types of kidneys in which subcapsular nephrectomy is most frequently indicated, both because of the relative ease with which it can be performed and because of the protection it affords neighboring structures from trauma while the kidney is being freed. It is to be remembered, however, that subcapsular nephrectomy is contraindicated in cases of renal tuberculosis and neoplasm, since all involved tissue should be removed as completely as possible in such cases.

The technic of subcapsular nephrectomy has been in use for many years. Mayo[1] stated that he saw a subcapsular nephrectomy done in Tuffier's Clinic in Paris in 1900. Then in 1914, in Petrograd, he[2] saw Federoff perform a subcapsular nephrectomy by a slightly different technic. Joly[3] credits Albarran[4] with first describing the method of isolating the ureter in subcapsular nephrectomy. Lazarus[5] described a method of protecting the diaphragm in difficult nephrectomies, which, from his description, represents a partial subcapsular nephrectomy. We, too, frequently do only a partial subcapsular nephrectomy, leaving only that portion of the renal capsule which is adherent to the diagram or peritoneum. Mathé[6] reported 9 subcapsular nephrectomies with no deaths in a series of 247 consecutive nephrectomies, an incidence of 3.6 per cent.

Subcapsular nephrectomy is a standard procedure described in virtually all textbooks on urology. Its advantages are: (1) the ease with which the kidney can be freed, thereby materially reducing operating time and shock to the patient, which is of particular value in cases considered to be poor risks, and (2) the freedom from

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possible trauma to adjacent structures. The most important reason this procedure is easy to perform is that the true capsule of the kidney may always be easily separated from the renal substance itself, thereby providing a cleavage plane, even in the most adherent kidneys.

The accidents which can occur during the performance of a nephrectomy include injuries to the diaphragm, pleura, duodenum and pancreas on the right side; occasionally injury to the small intestine on either side, the stomach on the left, and the vena cava on the right; or evulsion of the renal pedicle on either side (fig. 1).

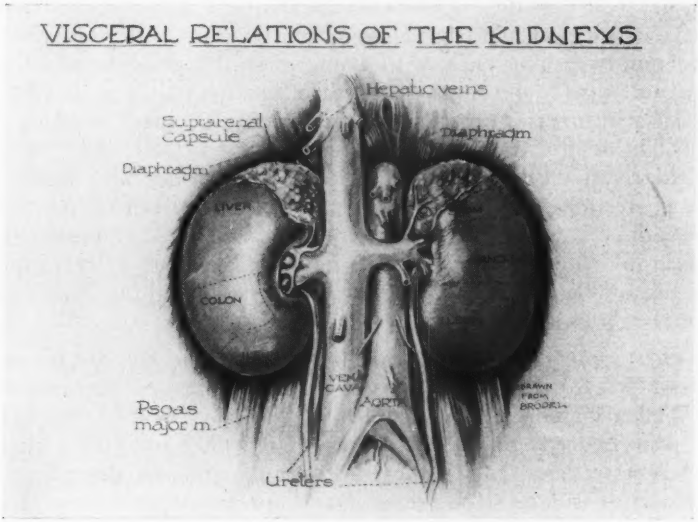

Fig. 1

The diaphragm and pleura may be torn during separation of dense adhesions at the upper pole. Injury to the pleura is usually recognized by the whistling sound of air entering and leaving the pleural cavity but the defect can be easily located and sutured. Opening of the peritoneal cavity occurs not infrequently in any type of nephrectomy and is of no great significance provided no abdominal viscera are injured. These defects are easily sutured and usually cause no serious complications. In subcapsular nephrectomy, however, the thickened capsule is left attached to the peritoneum and protects it and its contents. Injuries to the vena cava are not too uncommon. Papin[8] reported 81 cases of injury to the vena cava from the literature with 24 deaths; these injuries occurred during attempts at freeing extremely adherent kidneys. The vena cava is also occasionally incised when dividing the pedicle on the right.

Dodson[6] refers to 2 cases of injury to the vena cava, one of which was sutured and the other controlled by placing a curved clamp on the torn area for 72 hours; both patients recovered. Colic fistulæ also occur but usually heal without much difficulty. Young[9] reported one death from injury to the pancreas occurring during nephrectomy on the right side. In necrotic kidneys occasionally the renal pedicle itself may be torn during attempts to dissect the kidney free. If this should happen while using the subcapsular technic, the inflammatory capsule surrounding the pedicle will prevent retraction of the

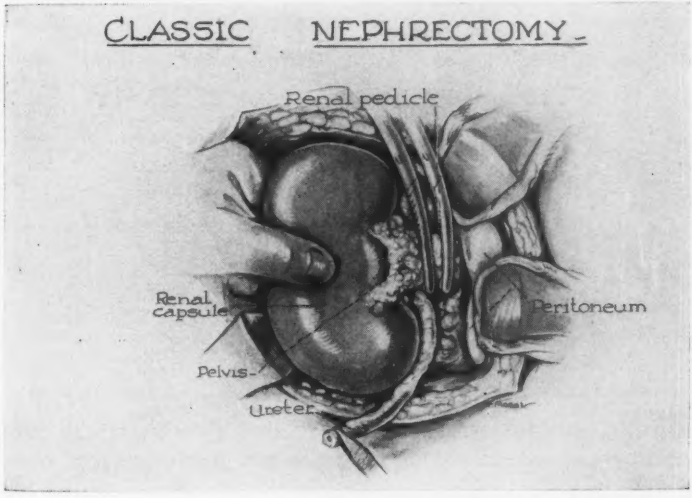

Fig. 2

vessels so that it will be relatively easy to clamp them. Schneider[10] reviewed 29 previously reported duodenal fistulae following nephrectomy on the right side. Eight of these were for pyonephrosis, 3 for stones, 2 for hydronephrosis, and 1 for a perinephric abscess. The lesion was not indicated in 5 cases. He then reviewed 546 right renal operations performed at Charity Hospital of Louisiana at New Orleans between 1906 and 1942; in this group there were 4 duodenal and 2 fecal fistulæ, a total incidence of 1.1 per cent. Of all the reported cases of duodenal fistulæ treated conservatively, 45 per cent survived and of those operated on 50 per cent survived.

The technic of classic nephrectomy will not be described in detail but is illustrated in Figure 2. The kidney has been dissected free, the ureter clamped and separated and clamps have been applied to the pedicle.

The technic of subcapsular nephrectomy as performed by us (fig. 3) consists in the usual lumbar Mayo incision which is used for the classic nephrectomy. Gerota's fascia is then opened as far posteriorly as possible and the kidney is exposed. The last rib is resected whenever necessary to provide additional exposure. The convex border of the kidney is exposed without attempting to mobilize

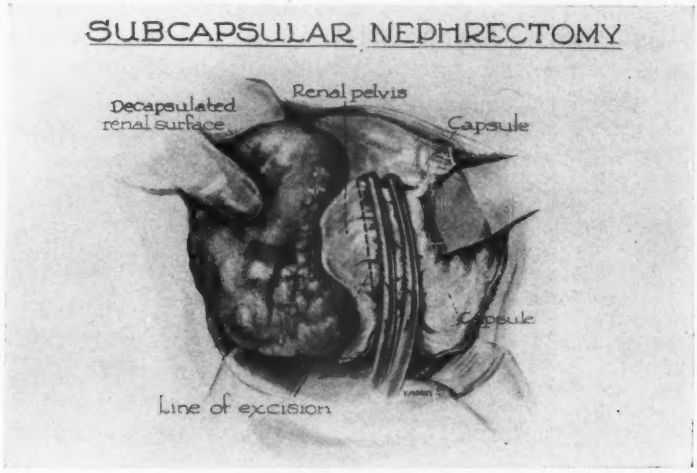

Fig. 3

the entire kidney. An incision is then made through the inflammatory capsule and the true capsule down to the renal cortex itself along the convex border of the kidney. With a finger, the kidney is then shelled out of its capsule down to the hilum. The true capsule can always be relied upon to separate easily from the kidney substance, providing an excellent line of cleavage even in the presence of the most advanced lesions. Two clamps are then applied to the pedicle over the reflected capsule and the kidney is excised, leaving a temporary cuff of tissue distal to the more superficial clamp to guard against slipping of the pedicle through the clamps. This excess tissue is later trimmed off after the pedicle has been secured. The pedicle is ligated with transfixion sutures of chromic catgut. If convenient and feasible, the ureter can be isolated and divided in the usual manner; otherwise, it is ignored. At times it is necessary to decapsulate only that portion of the kidney adherent to the diaphragm or peritoneum with complete extracapsular dissection of the remaining surfaces; this reduces the amount of inflammatory tissue left in the wound. There is sometimes sufficient oozing from

the inner surface of the remaining capsule to warrant packing the wound for 48 hours. Otherwise a simple penrose drain is used. The wound is then closed in the usual manner.

We have reviewed 34 cases of subcapsular nephrectomy performed by members of the Department of Urology at the Ochsner Clinic during the past few years. For purposes of comparison we have also analyzed our last 100 cases of classic nephrectomy. It

NEPHRECTOMY-	SUBCAPSULAR			CLASSIC		
NO. OF CASES	34			100		
AGE	max. 76	min. 20	av. 49	max. 75	min. 4 mos.	av. 43
SEX	male 14		female 20	male 44		female 56
PREVIOUS RENAL SURGERY	8 cases (23.5%)			2 cases (2%)		
OPERATIVE RISK	good 2	fair 14	poor 18	good 53	fair 41	poor 6
OPERATIVE TIME (minutes)	max. 113	min. 42	av. 72	max. 114	min. 50	av. 84
HOSPITAL DAYS Postoperative	max. 32	min. 11	av. 16	max. 27	min. 10	av. 15
WOUND DRAINAGE (days)	max. 153	min. 15	av. 49	max. 113	min. 12	av. 30
DEATHS	2 1-cerebral accident (5.88%) 1-Septic infarct			2 1-Pulmonary (2%) Embolus 1-Uremia		
COMPLICATIONS	1 persistant wound drainage			1 Colic Fistula 1 persistant wound drainage		

Fig. 4

seemed necessary to include at least 100 cases of classic nephrectomy in order to obtain a true picture of the various types of pathologic lesions for which this procedure is indicated. The diagnosis in the 34 cases of subcapsular nephrectomy are shown in Table 1.

TABLE 1

Diagnoses in 34 Subcapsular Nephrectomies

Diagnosis	Number of Cases
Calculous Pyonephrosis	21
Infected Hydronephrosis	9
Infected Cyst	1
Cortical Abscess	1
Ureteral Fistula with Retroperitoneal Extravasation	1
Incomplete Nephrectomy	1

As can be seen, a diagnosis of calculous pyonephrosis or infected hydronephrosis was made in 30 of the 34 cases.

The distribution by sex and age is shown in Table 2. The average age of the patients having classic nephrectomy was six years younger than the subcapsular group.

TABLE 2

Subcapsular and Classic Nephrectomies

Distribution by Sex and Age	Subcapsular	Classic
Number of Cases	34	100
Sex		
Male	14	44
Female	20	56
Age (years)		
Average	49	43
Maximum	76	75
Minimum	20	4 mo.

Table 3 gives a comparison of the operative risk, previous renal operations, operative time, duration of hospitalization, duration of drainage from the wound and complications of both types of nephrectomy. All patients in both series were classified by members of the Departments of Medicine and Anesthesia as good, fair or poor operative risks. As indicated in the table, over 50 per cent of the subcapsular group were considered poor risks whereas over 50 per cent of the classic group were good operative risks. Eight of the subcapsular group and only 2 of the classic group had had previous renal operations. The average operative time was 72 minutes

TABLE 3

Comparison of Subcapsular and Classic Nephrectomies

	Subcapsular	Classic
Operative Risk		
Good	2	53
Fair	14	41
Poor	18	6
Previous Renal Operations	8 (23.5%)	2 (2%)
Operative Time		
Average	71.6	83.8
Maximum	113.0	114.0
Minimum	42.0	50.0
Hospital Days		
Average	16	15
Maximum	32	27
Minimum	11	10
Wound Drainage (days)		
Average	49.1	30.5
Maximum	153.0	113.0
Minimum	15.0	12.0
Complications	1	2
Deaths	2	2

for the subcapsular nephrectomy and 84 minutes for the classic nephrectomy. Subcapsular nephrectomy does not increase the hospital stay, as the average duration of hospitalization was about the same for both groups.

Persistent drainage of the wound is one of the inconveniences of subcapsular nephrectomy. The average duration of drainage for the subcapsular group was 49.1 days but only 30.5 days for the classic group. The patient having a subcapsular nephrectomy, in whom the wound drained for 153 days, later required a second operation for removal of a calculus in the renal pelvis which had been deliberately undisturbed at the first operation. This represents the one undesirable sequel to this procedure, that is, occasionally there may be persistent, purulent drainage from these wounds due to retained infected elements, usually part of the inflammatory capsule, which will necessitate reopening the wound at a later date to scrape out or cauterize this capsular lining. However, this was necessary only in the one case just cited in the series of subcapsular nephrectomies and it also occurred in one of the cases in the classic group. In this case the wound drained for 113 days and a second operation was required to scrape out and pack the wound. The only other complication was a colic fistula in a case of extensive renal neoplasm following classic nephrectomy.

The mortality rate (Table 3) for the subcapsular nephrectomies was only slightly higher (5.88 per cent) than for the classic (2 per cent). The two deaths in the subcapsular group both occurred in old women. A 76 year old woman had an uneventful postoperative course for the first 16 postoperative days but died on the 17th day of cerebral hemorrhage. The other death was due to a septic infarct in a 74 year old woman on the 62nd postoperative day; a month before we saw her, she had been operated on for intestinal obstruction and because of recurrent chills and fever from calculous pyonephrosis nephrectomy had to be performed. In the classic group one death occurred in a 43 year old man from uremia and the other in a 64 year old man from a pulmonary embolus.

Discussion

From these statistics it can be seen that there is an average saving of about 12 minutes in operating time when the subcapsular technic is used; in addition, the incidence of shock and trauma is reduced, a factor which in old or debilitated patients is of considerable importance. It should be pointed out that this comparison does not give the actual difference in operating time or in the difficulties which would have been encountered had we attempted a classic nephrectomy in these 34 cases of subcapsular nephrectomy. It

would be impossible to estimate accurately the resulting degree of shock and trauma incurred had we attempted complete mobilization of the kidney with its inflammatory capsule in these cases. The low incidence of trauma and the low mortality rate in our series of classic nephrectomies emphasize the fact that complete dissection of the kidney should be attempted only when the kidney can be easily mobilized with minimum risk to the patient. Since 56 per cent of the patients who had subcapsular nephrectomy were over 60 years of age and 53 per cent were considered poor operative risks, any injury to neighboring structures would have materially increased our mortality rate.

Summary

1. The history of subcapsular nephrectomy has been reviewed.

2. Possible injuries incident to nephrectomies have been discussed.

3. An analysis of 34 cases of subcapsular nephrectomy has been compared with that of 100 classic nephrectomies.

4. The indications and advantages of subcapsular nephrectomy have been discussed.

5. The technic of subcapsular nephrectomy which we use has been described.

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PLACENTA ACCRETA WITH VELAMENTOUS INSERTION OF THE CORD

Report of a Case Treated by Hysterectomy Following Normal Delivery

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A well developed, well nourished, white woman, aged 25, para 1, gravida 2, presented herself on Feb. 27, 1948, for obstetric care. She had had a pregnancy in 1946: gone full term and delivered an 8½ pound living male child after a 48 hour labor in a persistent occiput posterior, during which time many attempts were made with forceps to effect delivery by personnel in a military hospital.

For the present confinement, the following antepartum history is pertinent. Last menstrual period, July 1, 1947. Quickening early November, 1947. Due date April 7, 1947. The patient's general physical condition was excellent. The pelvic examination revealed a badly lacerated cervix with a 4+ erosion and 4+ vaginal discharge. The perineum was so relaxed that the vaginal mucosa over a large rectocoele extruded from the vaginal orifice, as did the mucosa covering a cystocoele. The blood pressure was within normal limits throughout the pregnancy. The urine was free of albumin. The total weight gain was 19 pounds. Serologic reaction of the blood was Kahn negative. The patient belonged to blood group O, Rh factor +.

The events in the delivery of this woman were perfectly normal through the first two stages. The pains began at 10 o'clock in the evening of April 1. The membranes ruptured spontaneously at 4:15 the following morning. First stage ended at 4:20 with an occiput right posterior which rotated unaided into the anterior position on the vaginal floor and the fetus delivered spontaneously at 4:48 a.m., six hours and a half from the onset of labor. The baby was a living male, weighing 5 pounds, 9 ounces, whose color was good and who cried spontaneously.

The patient received 1 c.c. of pitocin at the birth of the baby. Following the tying of the umbilical cord and inspection of the perineum for laceration, a time interval of perhaps 5 minutes, manual pressure was applied to the fundus of the uterus to help expulsion of the placenta. During the compression the umbilical cord would come out of the vagina for 2 to 3 inches and then recede when pressure was released. During this maneuver approximately 250 c.c. of bright red blood poured from the vagina and then stopped. Introduction of the fingers through the cervix and along the uterine wall failed to demonstrate a line of cleavage between placenta and uterus. The diagnosis placenta accreta was made and the uterus and vagina packed with gauze without further attempts to deliver the placenta. Now the patient who had previously appeared in good condition suddenly began to show signs of shock; 1000 c.c. saline and glucose and 500 c.c. plasma were started until patient could be prepared for surgery. During operation under gas anesthesia the patient received 500 c.c. of whole blood. At surgery a supravaginal hysterectomy was performed and the patient returned to her room in fair condition where she continued to receive whole blood, adrenal cortex and penicillin by vein.

Twelve hours after surgery the temperature was normal and the pulse 90 with a good postsurgical condition generally. During the next 48 hours the patient's temperature rose to 102.4 F., but returned to normal and remained

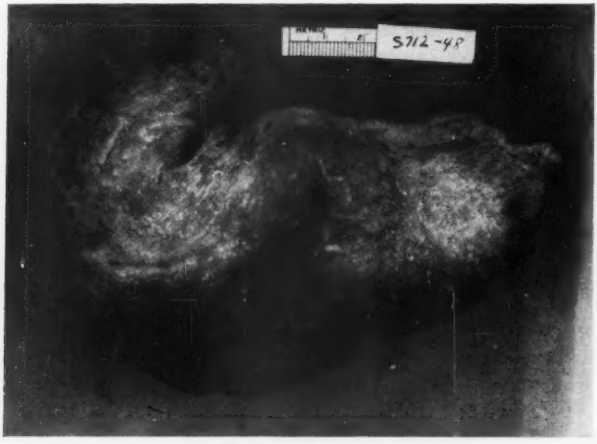

Fig. 1. Presents cut surface through placenta and uterine wall demonstrating the thinning out to the serosal layer caused by the placental invasion.

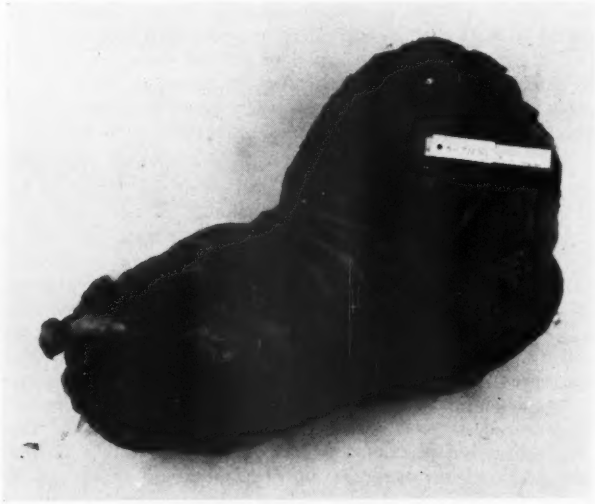

Fig. 2. Presents the placental surface demonstrating the large clot formed at the velementous cord insertion indicating hemorrhage in utero. *x*—large hematoma; *y*—stump of velamentous cord attachment.

so following large doses of penicillin (100,000 units every 3 hours) and forcing of fluids per os and parenterally. The rest of the hospital stay was uneventful and the patient was discharged ambulatory on the sixth postdelivery day.

The gross specimen removed at surgery is a large gravid uterus weighing 1120 Gm. Adherent to the entire endometrial surface is a firmly attached placental mass. There is no definite line of cleavage between the placenta and the uterus. In some areas the myometrium underlying the adherent placenta measures as little as 5 mm. in thickness. In these areas the myometrium

Fig. 3. Enlargement of microscopic section through area of invasion of muscle of uterus by anchoring villi.

Fig. 4. Enlargement of microscopic section through area of invasion of muscle of uterus by broad anchoring villi.

is firm and compressed; elsewhere it is thick, gray, soft and contains numerous sinuses. The placenta is abnormal in other respects in that several thick congested blood vessels traverse the fetal membranes for a distance of 14 cm. before they enter and leave the cord, which arises from the fetal membranes rather than from the main placental mass. There is a large hematoma at the base of the umbilical cord, measuring 6 by 5 by 4 cm. The cord measures 5 cm. in length.

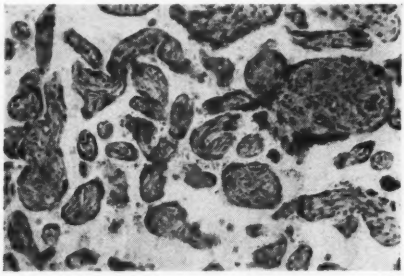

Fig. 5. Photomicrograph of uterine wall at site of placental invasion.

Microscopic studies of the specimen: Section of the wall of the uterus reveals that there is a diffuse hypertrophy of the muscle fibers. The serosal cells are swollen. The muscularis beneath the adherent placenta is thin and exhibits degeneration of the individual fibers. The placenta is composed for the most part of chorionic villi, many of which are fibrotic and hyalinized. The placenta is attached to the wall of the uterus by broad anchoring villi. The area at the junction between the placenta and the decidua is composed of hyalinized decidual elements rather than necrotic fibrin. Scattered throughout the wall of the uterus, especially at the placental site, are numerous thick-walled blood vessels.

Diagnosis: (1) Gravid uterus, (2) Placenta accreta, (3) Velementous insertion of the umbilical cord.

This case of placenta accreta with concomitant velementous cord insertion which was recognized at once and treated by hysterectomy demonstrates the accepted method of conduct in dealing with this rare condition.

The velementous cord insertion represents a second complication to this already complicated case and in reviewing the literature no other such double abnormality is reported.

The diagnosis of simple retained placenta is usually quite obvious but the possibility of an accreta being present must always be kept in mind. Phaneuf[1] from a review of the literature, showed that it occurred only once in 14,622 deliveries, but unless managed by a preconceived plan by the obstetrician the mortality is one of the highest in obstetrics.

By the placenta accreta is meant an abnormal adherence of the entire placenta or part of it to the uterine wall with partial or complete absence of the decidua basalis. Kaltreider[2] divided this abnormality into three types: (1) placenta accreta in which the placenta is adherent only pathologically, (2) placenta increta in which there is in addition penetration of the uterine wall and (3) placenta percreta in which the uterine wall is invaded to its serosal layer (as in our case) and the invasion may actually rupture the uterus.[6]

In the etiology of placenta accreta the main factors involved are apparently some injury to the endometrium either by trauma, infection or other gynecologic disorders.[7] There are no symptoms in complete placenta accreta because the placenta is not separated. Symptoms appear only after unsuccessful attempts to remove the placenta manually have forced separation by tearing with resultant bleeding. The treatment of choice in all cases is immediate abdominal hysterectomy.[3-6,8] The procedure involving invasion of the uterus with manipulation of the adhered placenta gives rise to sudden hemorrhage, which may lead to irreversible shock or needlessly expose the patient to dangerous infectious sequellae and should be discarded at once when a condition of placenta accreta is suspected to exist.

The foregoing case report of placenta accreta with velementous insertion of the cord presents one of the rare and extremely dangerous complications of pregnancy. The following conclusions are drawn from this study. (1) Placenta accreta occurs in multipara in the second and third decades of life. (2) The predisposing factors are previous manual removal of placentae, or other traumata to the endometrium. (3) Early recognition of the existence of the condition is of primary importance. (4) Once the diagnosis is established immediate replacement of blood loss by transfusion followed by supravaginal hysterectomy is the recognized treatment in placenta accreta.

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THE CONGENITAL ABSENCE OF THE PECTORALIS MAJOR MUSCLE IN WHOLE OR IN PART AND THE ABSENCE OF THE PECTORALIS MINOR MUSCLE (UNILATERAL)

Report of 3 Cases

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IN culling out the literature on the congenital absence of the pectoralis major muscle in whole or in part, and the absence of the pectoralis minor muscle, it is found that, while unusual, this type of case is more common than one would suspect at the first glance. Most of those who have observed a case, when reporting it or presenting it before some medical assembly, seem to be carried away with their find as a medical curiosity. If they had searched the literature for a parallel case they would have found themselves far from what they had anticipated and the subject anything but an anemic one.

The majority reported have been isolated cases, but in some instances more than one case has been reported in one communication. Reports have come from the States, from the South of us, and abroad, especially in the German literature. Yes, every tongue seems to have had its say upon the subject, not exempting China.

The anatomy of the pectoralis major and minor muscles and their functions are as follows:

The anatomy of the pectoralis major muscle briefly is: A thick, fan-shaped muscle situated at the upper and forepart of the chest. It is in two portions, the clavicular and the sternocostal portions respectively. The clavicular portion arises from the anterior surface of the sternal half of the clavicle. The sternocostal portion arises from half the breadth of the anterior surface of the sternum, as low down as the attachment of the cartilage of the sixth and seventh ribs; from the cartilages of the true ribs and the aponeurosis of the oblique externus abdominis. From this extensive origin, the fibers converge toward their insertion. They all end in a flat tendon which is inserted into the crest of the great tubercle of the humerus.

Function: It is one of the inward rotators of the humerus. If acting alone, it adducts and draws forward the arm, bringing it across the front of the thorax, and at the same time rotating it inward.

Deficiency[1] or absence of the sternocostal part of the pectoralis major muscle is not uncommon. Absence of the clavicular part is less frequent. Rarely is the whole muscle missing.

The anatomy of the pectoralis minor muscle: It is a thin, flat, triangular muscle, situated at the upper part of the thorax, beneath the pectoralis major. It arises by three tendinous digitations from the upper margin and outer surface of the third, fourth, and fifth ribs, near their cartilages, and from the aponeurosis covering the intercostal muscles. The fibers pass upward and outward, and converge to form a flat tendon, which is inserted into the inner border and upper surface of the coracoid process of the scapula.

Function: It depresses the point of the shoulder, drawing the scapula downward and inward to the thorax, and throws the inferior angle backward.

Lewis[2] attributes the absence of the great pectoral muscle to an embryologic defect and goes into the development of the great pectoral as well as of the minor. He also gives an explanation of the absence of the different portions of the great pectoral muscle as well as the absence of the minor.

To quote Clark[3] "Huntington, Geo. S.: American Journal of Anatomy, Vol. 2: page 157, 1903, has traced the phylogeny of the pectoral muscles through the primates, and finds that these muscles present a great many variations in the different groups. Both Pectoralis Major and Minor show a great tendency to vary. That congenital pectoral muscle defects in general do not represent reversions is made probable by the striking absence of bilateral defects. As Wendel[6] points out, congenital pectoral muscle defects are (with a single exception) always unilateral." At the time of Wendel's communication, he could only locate one case of the congenital bilateral absence of the pectoralis major muscle and that was by v. Noorden.[5]

Bing[4] surveyed the literature religiously on the reporting of cases on the abnormalities of the muscular system in the quick and the dead. He found the pectoralis major and minor muscles to be the most common of the abnormalities, making 28 per cent of the total.

This thesis from here on will deal only with those cases that were found in the living subject.

In going over the literature, only four reportings could be found, covering 4 cases, where there was a bilateral congenital absence of the pectoralis major muscle. In 3 of these cases there was not a complete bilateral absence of the muscle. The fourth case could not be verified. In 2 of the cases there was a bilateral absence of the

pectoralis minor muscles. In the other 2 cases no mention was made whether the pectoralis minor was present or absent. These 4 cases were in the male.

V. Noorden's[5] case had a complete absence of the muscle on the left side, while on the right side the sternocostal portion of the muscle was absent and the clavicular portion was present. Both minors were absent. This is the first case to be reported where there was a bilateral congenital absence of the pectoralis major and minor muscles. The case of Wendel's[6] has a bilateral absence of the sternocostal portion of the muscle, while the clavicular heads were present. The minors were also wanting. Igna and Bratu[7] reported a case in a soldier, who had a bilateral absence of the sternocostal parts of the muscle, while the clavicular portions were present. No mention was made whether the minors were present or absent. Teodorescu[8] in reporting his case stated that there was a bilateral absence of the muscle. No mention was made of the minor muscles. In this case the original article could not be obtained to verify if there was a complete bilateral absence of the great pectoral.

The case of v. Noorden's[5] comes as near being a complete bilateral absence of the pectoralis major muscle in the cases reported. There being a complete absence on the left side and a partial absence on the right.

All other reports were on unilateral cases (right or left). In some of the cases there was a complete absence of the pectoralis major muscle, while others had a partial absence. The majority of the cases reported showed that there was also an absence of the pectoralis minor muscle.

Mutel and Vermelin[9] cited a case in an infant (male) four months of age, who had an absence of the sternocostal portion on the right side. No mention was made if the clavicular head was present. This is the first case to be reported in such a young infant.

Two of the cases to be reported herein were picked up during examination, while the third case was referred. In making examinations the subject is made bare as much as possible to the waistline and placed in an upright position, having the upper extremities placed at a right angle to the body.

If the great pectoral is missing, especially the sternocostal portion, the anterior axillary fold will be found wanting (the great pectoral muscle practically makes up the entire anterior axillary fold) and the upper anterior chest wall will be flat when compared with the opposite chest wall; more so if the minor is missing. It

will be observed that the posterior axillary fold stands out in relief if present. This is well brought out if the subject is fairly well developed, more so if well developed. In this type of subject the axillary space is deep, notwithstanding the absence of the great pectoral, as the posterior axillary fold backs up the space. (In the event that the subject is overweight, the space will be shallow, notwithstanding the presence of the posterior axillary fold.) Here, palpation and manipulation have to assist the discerning eye.

If the case is bilateral, the chest wall will be flat on both sides, in addition to the absence of the anterior axillary folds.

The writer reports 3 cases as follows:

CASE 1: L. H., white male, 35 years of age, 69 inches in height, 190 pounds in weight, is a machine operator by occupation. He is very well nourished and the muscles show good development. In having him stand erect, with both upper extremities outstretched at a right angle to his body (fig. 1),

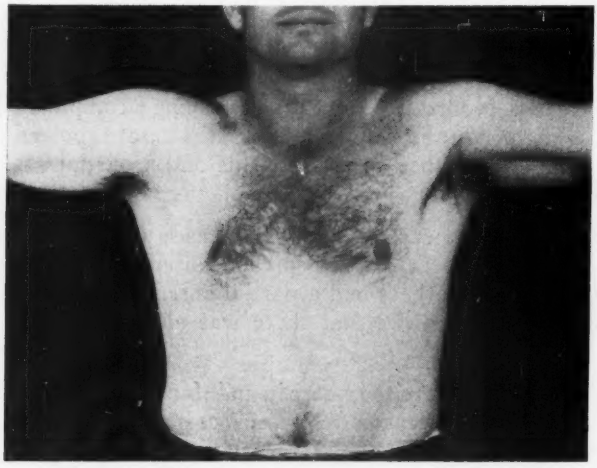

Fig. 1. (Case 1.) Complete congenital absence of the Pectoralis Major and Minor Muscles on the right side.

it is noted that the anterior axillary fold on the right side is found wanting, while the posterior axillary fold stands out. Upon further examination it was found that the entire pectoralis major muscle is absent on the right side and pectoralis minor is also missing. The skin over the right upper anterior chest wall is attached directly on the underlying ribs. It was noted that he has a rachitic chest of the pigeon type. The nipple on the right side is in normal position and there is no abnormality when it is compared with the nipple on the left. From the photograph it will be observed that the hair over the right chest is not as plentiful as on the left. Hair is about equal in both axillary summits. He stated that he did not sweat over the right upper anterior chest

wall as freely as he did over the left, but it was about the same in both axillary pits. There is full function of the right upper extremity when it is compared with the left. Both upper extremities are equal in length. He is right handed. He states that he is not handicapped in any way by this lack of muscle. He knew of this deformity when he was a child when comparing both sides of the chest by looking in a mirror, and by comparing himself with his brothers. His mother also noticed he was different from his brothers. None of his sisters or brothers have a like deformity. No other deformities can be found than the ones noted. He was accepted into the army and placed in the infantry. Upon his being examined for induction, no mention was made of, nor did he mention the deformity of the right chest wall.

CASE 2. E. W. B., white male, 24 years of age, 70½ inches in height, 156 pounds in weight, is a mechanic by occupation. He is well nourished and his muscular development is very outstanding. All of his muscles stand out in relief when they are brought into contraction. In having him stand in an upright position with both upper extremities outstretched at a right angle to his body (fig. 2), it is noted that the anterior axillary fold is not present on the

Fig. 2. (Case 2.) Congenital absence of the sterno-costal portion of the Pectoralis Major Muscle. The clavicular portion of the muscle is present and very well developed. The Pectoralis Minor Muscle is also absent. Right side.

right side, while the posterior axillary fold presents itself very markedly. Upon further examination it is noted that the abnormality is due to the absence of the sternocostal portion of the pectoralis major muscle, while the clavicular portion of the muscle is present and is very well developed. The deltoid is likewise very well developed. The pectoralis minor muscle on the right side is also found wanting. The skin over the right upper anterior chest wall is attached directly to the underlying ribs. There is an absence of hair over the right upper anterior chest wall. The summits of both axillas are about equal for the presence of hair. During the examination it was learned that sweating was absent over the right upper anterior chest wall, while it

was normal over the left. The nipple on the right is in a lower position on the chest wall than the one on the left.

Fig. 3. (Case 2.) Shows how the shoulders can be brought forward. Both clavicles are present and are normal.

It will be observed from Figure 3 that both shoulders can be brought forward to a marked degree. Both clavicles are present and normal. He is quite a contortionist. He has always known of his deformity and it has in no way handicapped him. He is very adept at all kinds of athletics. There is full function of the right upper extremity.

No other abnormalities can be detected than those brought out.

He was accepted by the army and placed in the infantry. Upon his physical examination at the time of induction his abnormality was detected.

CASE 3. L. S. M., white female, aged 38 years, height 65 inches, weight 128 pounds, is a housewife and the mother of 2 girls, aged 13 and 6 years respectively. She is very well nourished and the muscles show a good development. On having her stand in an upright position and with both upper extremities outstretched at a right angle to her body (fig. 4), it is observed that

Fig. 4. (Case 3.) Complete congenital absence of the Pectoralis Major and Minor Muscles on the left side. There is very little breast tissue and this did not function.

the anterior axillary fold is missing on the left side, while the posterior axillary fold stands out in relief. As the examination was pursued it was found that the pectoralis major and minor muscles were absent. The skin over the anterior left upper chest wall is attached directly to the underlying ribs. The left mammary gland is very poorly developed and never has functioned. She nursed her babies entirely from the right breast. From the photograph it will be noted that the areola on the left side is very faint and the nipple is exceedingly small when compared with the right side. The breast and nipple on the left side are situated higher on the chest wall when comparison is made with the right side. Hair is very plentiful in the right axilla but sparse in the left axilla. She stated that she never sweats over the anterior left upper chest wall. There is full function of the left upper extremity, and this lack of muscle has not handicapped her in any way. She knew of this deformity and her mother often spoke to her about it. Her brothers and sisters, as well as her mother and father, do not have a like deformity. Examination of her two children is normal for any muscle lack.

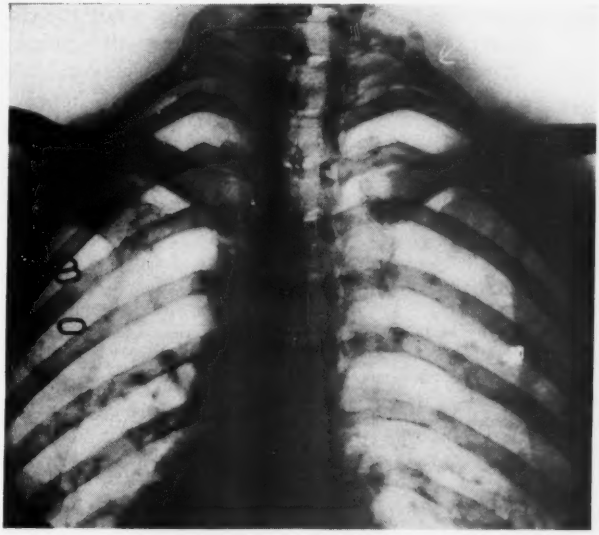

Fig. 5. (Case 3.) Complete bilateral cervical ribs. Old healed fracture of the clavicle on the left side.

On palpation over both of her clavicles, it was noted that over the left one there was some bony enlargement at the inner portion. She stated that when a young girl she fractured her left collar bone. Just above the clavicles at the root of the neck, two bony masses could be brought out when making deep pressure. An x-ray was made (fig. 5) and a complete bilateral cervical rib was found, also an old healed fracture of the left clavicle.

She presents no characteristic symptoms, such as sensory disturbances, pain, muscular atrophy, or peripheral vascular changes. The blood pressure, pulse rate and volume were the same right and left.

This case is the first one to be reported where a congenital absence of the pectoralis major and minor muscles, unilateral or bilateral, was associated with the presence of a cervical rib, unilateral or bilateral.

It will be noted that Lewis[2] who edited Gray's Anatomy, placed the sternocostal portion of the pectoralis major muscle as the most common portion that is absent or deficient, the clavicular portion as less frequent, while the entire muscle is rarely missing.

From the case reports that I have cited and from the study of the literature on the subject, as listed in the bibliography, and my 3 personal cases, no case has been reported where the clavicular portion of the muscle is absent while the sternocostal portion is present.

In this survey the sternocostal portion of the muscle was found to be the portion that was most commonly missing, while the clavicular portion was present. Next in order was where the entire muscle was absent. No case was reported where the clavicular portion was missing and the sternocostal portion was present, hence this will place the absence of the clavicular portion with the presence of the sternocostal portion present in third or last position.

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LEAD POISONING IN INFANCY

A Case in Which Two Operations Were Performed on the Stomach

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THE knowledge of lead intoxication goes back a number of centuries and it was probably recognized in the fifteenth century. Kato[1] writing on lead poisoning in Japan reviews the literature rather fully and states that lead poisoning from toilet powders was recorded in 1784 in an old medical monograph in Japanese. Lead intoxication in the newborn by fetal absorption through the placenta was reported by Ganiayne[2] and Legrand and Winter[3] in 1900 and 1902 respectively. Lead poisoning in children was reported in this country by Thomas and Blackfan[4] in 1914. Holt[5] in 1923 called attention to the fact that lead poisoning occurs in infants and attempted to put the medical profession on the alert for this condition even in very young infants. He reported one 8 months old and listed a number of common sources of lead poisoning, calling attention to ointments containing lead, paint on toys, paint on beds and cribs, and lead in nipple shields. He also called attention to the major symptoms of colic, vomiting, constipation, anemia, loss of weight, and the encephalopathies with delirium, convulsions, and coma, and to the palsies that occur. He also mentioned the basophilic stippling in the red blood cells. McKhann[6] in 1926 published an excellent paper on lead poisoning in children and little if anything has been added to the knowledge of this condition since that comprehensive report was made. Many other reports have appeared in the literature on lead poisoning in infants and children.[7-15] Bucy[7] in 1935 reported 3 cases simulating brain tumors. Glaboff[8] in 1939, Artz[9] in 1941, and Bourne[15] in 1944 reported cases of lead poisoning from inhalations of fumes from burning battery casings for heating purposes. Lead intoxication from the use of nipple shields was cited by Bass and Blumenthal[10] in 1939. An editorial in the Journal of the American Medical Association in 1940[11] called attention to lead poisoning in juveniles and warned of the strong possibility of chronic nephritis in later life. It stated that 80 per cent of those cases showing plumbism had some degree of permanent kidney damage. With few exceptions all of these observ-

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ers reported cases whose average age was 20 months or older. As pointed out by Holt[5] and Bass and Blumenthal,[10] acquired lead poisoning in early infancy is "exceedingly rare."

In searching the literature, it was found that only one group of clinicians had published any account of errors made in the application of surgery to cases presenting surgical symptoms but which symptoms in actual fact were caused by the effects of lead intoxication. Bucy and Douglas[7] in 1935 reported craniotomies on 3 cases of lead poisoning which were suspected of being intracranial tumors. Lead poisoning was discovered after the surgical procedures had been performed. The patient to be presented in this paper was operated on twice for a condition suspected of being pyloric stenosis before it was determined that the symptoms were due to lead poisoning. It is highly probable that other similar cases exist of which no reports have been made in the literature.

Case Report

E. T. R., a white male infant, aged 8½ months, was admitted to the hospital with symptoms of 3 months' duration: frequent drooling and spitting up of stomach contents.

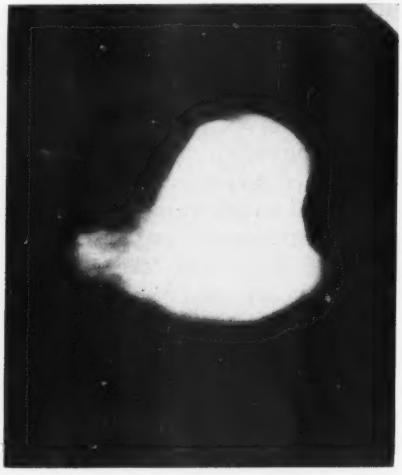

Fig. 1. Roentgenogram of the stomach following the ingestion of barium and milk showing the complete retention of the meal. Later exposures showed the stomach emptying in a delayed manner. There appeared to be some partial obstruction at the pylorus.

The past history revealed that the patient was the second child of a normal mother and father. There were no abnormalities at birth; labor and parturition were without difficulty. The birth weight was approximately 7½ pounds.

Development was normal, and no illness occurred until the age of 5½ months, when he began to spit up a small amount after each feeding. It was thought that the spitting up of food was due to a dietary disorder, and changes were made in his diet. The food spitting continued, and more changes were made in the diet and belladonna was administered. The amount of food lost by the effortless vomiting became greater as time went on. The child grew in stature, but he became thinner, his weight remaining constant.

On July 1, 1947, 3 months after the onset, a gastrointestinal roentgenologic study was made (fig. 1). It appeared from the roentgenograms that a partial pyloric obstruction existed and that it was probably due to a moderate hypertrophy of the pyloric muscle. A further attempt was made to overcome the symptoms by use of a heavy gruel diet, phenobarbital, and belladonna. The symptoms did not improve. Actual vomiting of large boluses replaced the milder spitting symptoms. It was at this time that hospitalization was effected. Operation was advised on the basis of the history and roentgenologic findings.

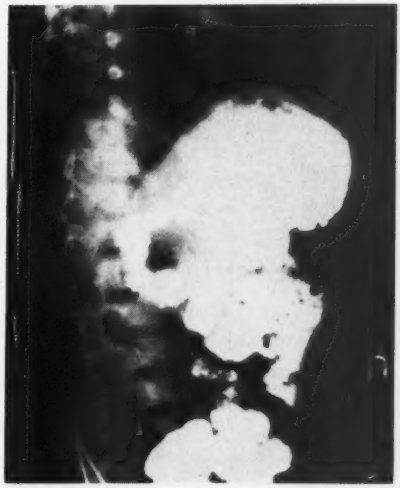

Fig. 2. Roentgenogram of the stomach following the ingestion of barium and milk, one month after a Rammstedt pyloroplasty. The stomach empties nor- There is very slight if any narrowing at the pylorus.

On 23 July a laparotomy was performed through a right transverse incision. There was no evident pathology at any point in the abdominal cavity except for a slight thickening of the pyloric muscle, which measured about 5 mm. in diameter. There was no real obstruction at this point, but it was decided that the lumen was smaller than it should be and a Rammstedt[16] type of operation was done, dividing the muscle strands on the anterior superior, avascular surface of the pylorus. A small nick accidentally made in the duodenum was closed immediately with fine catgut.

Following the operation, all vomiting ceased. A normal diet was prescribed in 5 days, and he was discharged to the care of his pediatrician.

One week after dismissal from the hospital the vomiting returned. This came at the same time that a stitch abscess occurred in the incision. The vomiting was worse at this time than before, and at times it was projectile.

The patient was readmitted to the hospital on August 14, 2 weeks after the first operation. A roentgenologic examination of the gastrointestinal tract revealed a slight delay in emptying at this time. He was kept under observation for 2 more weeks, but the vomiting continued and the weight dropped to 15 pounds 5 ounces. During this time two other roentgenologic examinations were made of the gastrointestinal tract, and these were reported as negative (fig. 2). The emptying time was normal, and there was no obstruction.

A spinal puncture was made, and nothing abnormal was found. The eyegrounds were normal. The neurologic survey was normal. There was a slight anemia, with 13 Gm. hemoglobin per 100 c.c. but no abnormalities were found in the red blood cells.

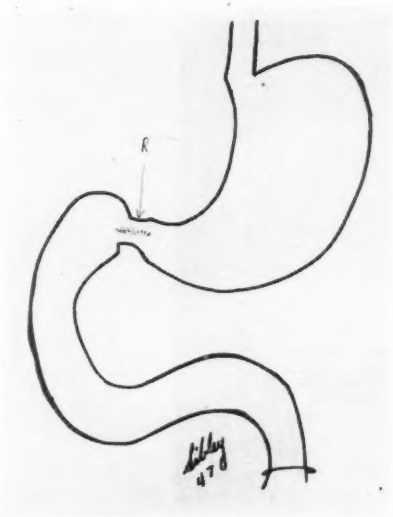

Fig. 3. Schematic drawing of the outline of the lumen of the stomach and duodenum as found at the second operation, approximately 6 weeks after Rammstedt pyloroplasty. "R" is for Rammstedt.[16]

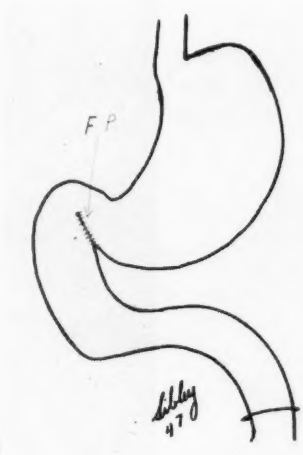

Fig. 4. Schematic drawing of the operative result following the performance of a Finney pyloroplasty. "F. P." is for Finney pyloroplasty.[17]

Three transfusions of 75 c.c. of citrated whole blood were administered. Adequate amounts of parenteral fluids were given. The condition became progressively worse. A consultation with the two pediatricians and with two surgeons resulted in the decision to operate again.

The surgeon (W. L. S.) was of the opinion that nothing was overlooked at the first operation and no positive findings were likely to be revealed by a second operation. Nevertheless, a second laparotomy was performed on 1

Sept. 1947. Complete exploration revealed no new pathology, but it was thought that the lumen of the pylorus might be too small since there was some scarring at this point from the previous surgery (fig. 3). There was a very small adhesion between the duodenum and the liver where the catgut sutures had been placed to close the nick made in the duodenum. The incision in the pylorus was completely healed, and no adhesions were present. A Finney pyloroplasty[17] was performed (fig. 4). A large pyloric outlet was obtained.

Following the pyloroplasty, recovery was relatively uneventful. There was gastric retention for 48 hours. There was a fever up to 103° F. the day following surgery, which disappeared with aspiration of the stomach. Transfusions and parenteral fluids were necessary for 4 days. At this time there was no further gastric retention. At the end of 10 days a normal diet was being retained. The weight increased from 15 pounds 5 ounces to 16 pounds 10 ounces in 12 days. He was dismissed from the hospital with no symptoms.

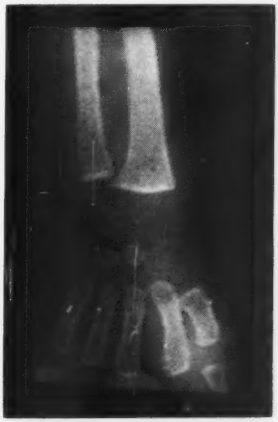

Fig. 5. Roentgenogram of the wrist showing the characteristic heavy metal deposit in the diaphyses of radius and ulna as revealed in the heavy screening of the roentgen rays along the lines where the metal (lead) is deposited. Close observation revealed 3 lines representing 3 periods of absorption and growth, following the 3 periods of exposure, namely: 1. Before the first operation, 2. before the second operation, and 3. after the second operation. The periods of nonexposure while in the hospital are the dark lines between the heavy lead lines and these are the periods of hospitalization. (See Figures 6 and 7 for clearer picture of the 3 lines.)

Three weeks after the second operation vomiting began again when another stitch abscess appeared in the incision. This time a third pediatrician* was called in by the family, and after a few days of observation in the home he noticed the child standing in its crib eating the paint from the railings. A large amount of the paint on the bed had been eaten away. The parents had paid no attention to this perverted appetite and stated it had been present for 4 or 5 months. He immediately decided that this was a case of lead intoxication from eating the paint on the bed. Roentgenograms of the skeletal system revealed the characteristic heavy lines in the diaphyses of the long bones which are present in heavy metal poisoning (figs. 5, 6, 7).

*Dr. Andrew D. Shapiro, Roanoke, Virginia.

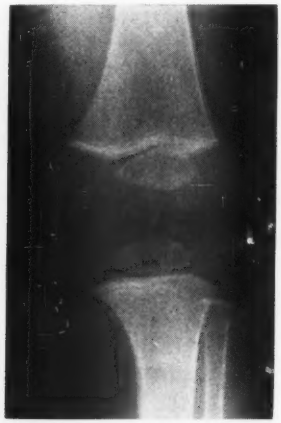

Fig. 6. Roentgenogram of the knee showing the characteristic heavy metal deposits in the diaphyses of femur, tibia, and fibula. The heavy lines are caused by lead deposits. See legend under Figure 5. Three periods of deposit of lead are clearly discernible.

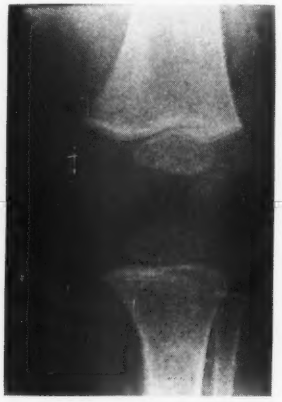

Fig. 7. Roentgenogram of the knee showing the characteristic heavy metal lines in the diaphyses of femur, tibia, and fibula as found in lead intoxication. See legends for Figures 5 and 6. Three lines are seen, representing 3 periods of ingestion of lead and deposit in the bones.

The diet was altered so as to fix the lead in the bones and further satisfaction of the perverted appetite of eating paint was prevented. Within a few weeks the vomiting ceased, and there was a gain of 2 pounds in weight. Roentgenologic examination of the stomach was normal, with ready emptying of the barium meal (fig. 8).

Discussion

In going back over the history in this case, it was ascertained that

Fig. 8. Roentgenogram of the stomach taken after the Finney pyloroplasty and following the ingestion of barium and milk showing that the stomach empties normally, and that there is no obstruction.

the father had decided to paint the crib which had been used for the first baby as soon as he learned a second one was on the way. He bought and applied ordinary lead paint to the bed, being unaware that manufacturers of babies' beds are now using paints made from vegetable compound instead of lead[8] because of the danger of lead poisoning. Dr. Shapiro has listed this act of painting the baby's bed by well-meaning parents as one of the "pitfalls of parenthood." The vast majority of people are ignorant of the dangers to their infants and children of lead paints and lead toys. So many children have perverted appetites. This baby tried to chew on everything he could get to his mouth.

There are many things that children eat and chew on that contain lead. Rathwell and Smith[13] traced lead poisoning to toy dishes and cups that were being sold in a department store as "pure aluminum." One of the cases reported by Bucy and Douglas[7] was caused from eating wall plaster which contained lead. And there are many other sources of lead intoxication as already indicated which have been reported in the literature.

The toxic symptoms of lead poisoning occur when soluble lead is circulating in the blood.[6] When it is fixed in the long bones, it does not cause symptoms. If at any time the lead stored in the bones is mobilized, toxic symptoms may occur. Acidosis and alkalosis tend

to mobilize the lead. Its movement in the body parallels that of calcium. Any change that causes changes in calcium movement will do the same for lead. This phenomenon gives credence to the rationale of the high calcium, high phosphorus diet in the treatment of the acute symptoms due to lead intoxication, particularly the lead encephalopathies which are very often fatal.

The symptoms of lead intoxication may be mild or they may be very severe. There is nearly always a perverted appetite. And almost uniformly the parents pay no attention to it and do not mention it when illness occurs.[6] Many weeks may elapse following ingestion of the lead, particularly if it is stored in the bones. Symptoms may then occur during some febrile state or in case of acidosis wherein the lead is mobilized into the circulation. It is noted that exacerbations of the symptoms in the case reported in this paper were concomitant with the appearance of stitch abscesses. Anemia is frequent, and there is usually a basophilic stippling of the red blood cells. Some degree of gastrointestinal disorder is uniformly present. There may be vomiting (sometimes projectile), constipation, and colic. Weight loss is frequently noted. There may be paralysis from lead neuritis, ataxia, weakness of the limbs, and pains in the joints. Strabismus is frequently found. There may be papilledema and fundic hemorrhages. Sometimes there is stiffness of the neck. The spinal fluid frequently reveals increase in pressure even up to 600 to 700 m.m. water, with increase in protein content and lymphocytes.[7] The spinal fluid and blood picture may be entirely normal, as was true in this case, and also in one of Bucy and Douglas.[7] In the acute encephalopathies, convulsions, stupor, and coma are quite common, and a fatal outcome is frequent in this type of case unless the lead can be quickly fixed in the bones. In addition to the above findings, roentgenograms of the long bones will reveal the deposition of the lead along the diaphyses in heavy lines (figs. 5, 6, 7). Lead may be demonstrated in the blood and urine and feces by several methods, including the spectroscope. There may or may not be a lead line on the gums. It is said these infants have large heads. Lead is found in the brain, liver, kidneys, and other tissues at necropsy. Lead arachnoiditis is frequent in the encephalopathies.

The treatment of lead intoxication in infants and children is still problematical. It is certain that deleading should never be attempted in the presence of acute symptoms, particularly those of the encephalopathies. Deleading should not be attempted in infancy. It may be tried cautiously in older children, being on the alert for symptoms indicating intoxication from the soluble lead in the blood. As indicated above, the diet must be low in calcium to

mobilize lead. It is accomplished by deleting milk, egg (phosphorus), green vegetables, and many fruits. McKhann[6] advocates a diet of meat, liver, potatoes, tomatoes, rice, corn, bananas, and milk-free bread when conditions are suitable for deleading. Ammonium chloride may also help mobilize the lead. Some investigators are against the deleading by any planned method and advocate the fixation in the bones.[9] Vitamin C in large doses has been advocated, but according to some investigators,[12] it is not reliable, as lead ascorbate is toxic in itself. Gedgoud[14] reported good results in the treatment of lead intoxication using 2.5 Gm. of sodium citrate daily. This treatment was inspired by the use of sodium citrate in adults with doses of 10 to 20 Gm. daily by Kety and his co-workers.[18,19] The rationale of this treatment is reported as being the formation of soluble lead citrate which is said to be nontoxic. However, Bourne[15] reported a case made worse by the use of sodium citrate and recommends caution in its use, especially in acute cases.

SUMMARY

1. Lead poisoning in infancy is discussed.

2. A case of lead intoxication in an infant is reported. This baby presented signs and symptoms suggestive of an atypical pyloric stenosis.

3. It is probable that two unnecessary operations were performed on a case of lead intoxication.

4. The factors necessary for diagnosis of lead intoxication are emphasized. Roentgenograms of the long bones will make the diagnosis by showing the dense deposit of lead in the diaphyses (figs. 5, 6, 7).

5. Even with the best of care, a small detail may be overlooked. The surgeon must be on the alert for lead intoxication.

6. Something should be done to educate parents about the dangers of lead poisoning and perverted appetites, particularly as regards painting the baby's bed and toys with lead paint.

7. Deleading should not be done in infancy and only with caution in older children.

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NON-OBSTRUCTIVE LESIONS OF THE COLON

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THE selection of lesions of the colon which are non-obstructive must be somewhat arbitrary, for, in their incipiency, most of them produce no obstruction and yet the majority are potentially obstructive. In this discussion, emphasis will be placed upon those lesions which are usually non-obstructive. They may be classified as: (1) congenital malformations, (2) inflammatory disease, (3) neoplasm, and (4) extracolonic lesions with secondary involvement of the colon.

The colon is best examined by means of the opaque enema. Fluoroscopic observations with the patient in various positions during the administration of the enema and subsequent pre-evacuation and post-evacuation films constitute an adequate examination in most cases. Frequently, double contrast studies are of great value. Repeated examinations may be necessary.

I. CONGENITAL MALFORMATIONS.

A. Normal Variants.

Great variations in the length and position of the colon make it impossible to draw a sharp line of distinction between anatomic variants and congenital anomalies. Ptosis of the transverse colon and redundancy of the sigmoid flexure are so frequently found in asymptomatic individuals that they are usually considered to be normal anatomic variations.

B. Congenital Anomalies.

Malposition of the cecum is one of the most common anomalies of the colon. Interference with the normal fetal processes of rotation of the colon with subsequent descent of the cecum is responsible for a variety of colonic patterns intermediate between the normal fetal pattern and the normal postnatal pattern. Arrested rotation of the cecum is often associated with a failure of rotation of the small intestine. It may be associated with a free mesentery for the cecum and ascending colon, and in such cases the cecum is hypermobile, a condition which predisposes to volvulus and intussusception.

Hepatodiaphragmatic interposition of the colon is a rare con-

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genital anomaly which may be of significance for 3 reasons: (1) the condition may cause constipation and flatulence and, rarely, complete obstruction of the colon; (2) it is commonly associated with gastric symptoms which may be due to pressure from the liver; (3) one must be aware of its occurrence in examining scout films of the abdomen for the presence of free air beneath the diaphragm.

Congenital diaphragmatic hernia is a relatively uncommon condition, characterized by protrusion of abdominal contents through the diaphragm into the thorax. Any abdominal viscus, except the bladder and rectum, may be involved. Most commonly, the stomach or colon is found to be herniated through a natural or acquired opening of the diaphragm, usually on the left side.

The cause of congenital megacolon or Hirschsprung's disease remains a disputed problem, but certainly of etiologic importance is imbalance of the autonomic sympathetic and parasympathetic nervous systems with relative hyperactivity of the sympathetic component. Typically, the cardinal symptoms of obstinate constipation and abdominal distention are present from birth or early life and persist with brief periods of remission throughout life. The clinical diagnosis is confirmed by a scout film of the abdomen and by examination with an opaque enema which demonstrates lengthening, atonicity and enormous dilatation of the colon. Medical therapy offers a chance for cure in some cases, estimates varying from 1.5 per cent to 25 per cent. Surgical treatment is indicated for intractable cases and for the relief of complications. Penick[23] and other surgeons believe that if medical therapy fails in a patient of 2 years or older, a left lumbar sympathectomy is in order, especially if spinal anesthesia produces a copious bowel movement. If this procedure fails, a right lumbar sympathectomy, with or without splanchnicotomy, may be performed at a future time. If sympathetic surgical procedures fail, intestinal resection may be indicated. Some prefer colonic resection in view of the reported frequency of volvulus, perforation and impaction following sympathectomy upon patients of this type. Segmental resections are useless because subsequent progressive dilatation proximal to the resected area frequently occurs. Colectomy in one or multiple stages and with anastomosis of the ileum to the lower sigmoid or upper rectum is the procedure of choice.

II. Inflammatory Disease.

A. Appendicitis.

Roentgen examination is of relatively little value in the diagnosis of appendicitis. Segmentation of the appendix, as demonstrated by

the ingested meal or the barium enema, is an entirely functional phenomenon and is not indicative of appendiceal disease. Moreover, failure of visualization, prolonged isolated filling, angulation of the appendix and the demonstration of fecaliths are observed in asymptomatic individuals and do not justify the diagnosis of appendiceal disease. Fixation of the appendix and regional tenderness in association with a fixed appendix are the two most helpful diagnostic findings. The demonstration on the roentgenogram of appendiceal calculi is of great importance because of their nearly constant association with acute appendicitis with an incidence of perforation of nearly 50 per cent. An appendiceal abscess may be demonstrable by the production of a smooth pressure defect along the inner border of the cecum, usually accompanied by displacement of the terminal ileum. The value of roentgen examination in cases of right lower quadrant pain is to disclose organic or functional disorder of the cecum or ileum or to determine factors outside of the colon which may explain the clinical findings.

B. Ulcerative Colitis.

Nonspecific ulcerative colitis is an inflammatory disease of unknown etiology characterized bya chronic course of diarrhea and passage of blood and/or mucus with spontaneous remissions and exacerbations. Clinically and pathologically it is indistinguishable from chronic bacillary dysentery except by positive bacteriologic evidence. It occurs at all ages, but is most common during the second, third and fourth decades. The diagnosis is made by (1) the history; (2) proctoscopic demonstration of a diffusely granular, friable, superficially ulcerated and bleeding mucosa; (3) failure to find a specific cause for the inflammation; and (4) opaque enema examination. The process begins with hyperemia and edema of the mucosa which is followed by the formation of miliary abscesses which break down to form ulcers which are shaggy in appearance. As the disease progresses, there is diffuse infiltration of all layers of the colon and nodular hyperplasia of the mucosa with formation of pseudopolyps. Later, diffuse thickening and fibrosis occur with contraction and shortening of the colon. The inflammation may begin almost anywhere in the colon and may be segmental in its initial distribution, but in the majority of cases it begins in the rectum and progresses in a retrograde manner to involve ultimately the entire colon and, sometimes, the terminal ileum. Examination of the colon by means of the barium enema in the initial stages of the disease may reveal no abnormalities other than irritability and slight alterations in the mucosal relief. Later in the course of the disease, or early in florid cases, the irregular, shaggy ulcers are readily demon-

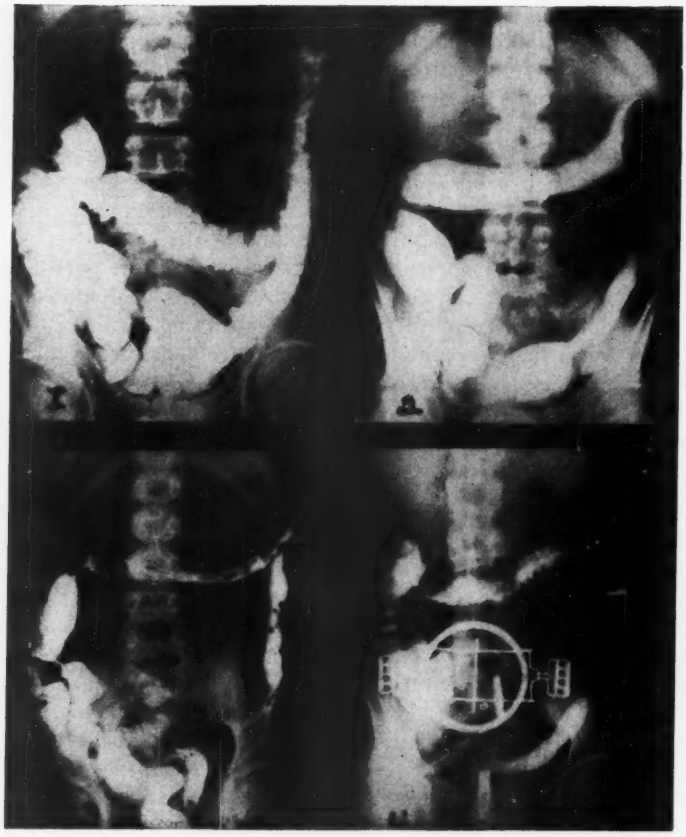

Fig. 1. (1) Shaggy ulcers in a horia case of acute ulcerative colitis. (2) Typical "lead pipe" colon of chronic ulcerative colitis. There is definite deformity of the terminal ileum. (3) Pseudopolyposis in a case of chronic ulcerative colitis in a 14 year old boy. (4) Active chronic ulcerative colitis one year after an ileostomy had been performed.

strated. Irregularly outlined translucent areas due to polypoid changes may be seen in chronic cases indicating involvement of all coats of the colonic wall and nodular hyperplasia of the mucosa. In the late stages of the disease, the roentgen findings are characteristic: the colon is short, thick, rigid and tubular with complete loss of normal haustrations; there is segmental variation in caliber and there may be localized strictures; the ileo-cecal valve is usually large and there is ready regurgitation of the enema into the terminal ileum. Localized segments may show advanced changes, but usually the most extensive involvement is noted in the distal portions of the colon.

C. Amebiasis.

Amebiasis is a specific inflammatory disease of the colon caused by *Endamoeba histolytica* and characterized by a chronic course of intermittent attacks of dysentery. It has recently become of increased significance because service men returning from endemic zones may transport it to areas previously free of the disease or increase its incidence in areas where it is already prevalent. In contrast to nonspecific ulcerative colitis, the cecum is the site of predilection for the development of the parasites; the ascending colon, rectum, sigmoid and appendix follow in frequency of involvement. Less commonly, diffuse lesions are scattered throughout the colon; roentgenologically, they resemble the lesions of ulcerative colitis. The most valuable roentgen signs of amebiasis are rapid small bowel motility with normal pattern, irritability of the cecum, and deformity of the cecal tip. The terminal ileum is almost invariably normal. Stenotic lesions due to amebic granuloma usually occupy a relatively long segment of colon, they sometimes are multiple and there is elasticity in the narrowed segment. Moreover, the mucosal pattern is slightly irregular, the transition to normal colon is gradual, and the deformity usually decreases or disappears following antiamebic therapy.

D. Diverticulitis.

Diverticula of the colon represent simple herniations of mucous membrane through the wall at sites of diminished resistance. The incidence of diverticulosis is said to be about 5 per cent in people over 40 years of age, and in about three fourths of the cases there is involvement of the sigmoid colon. The pouches are often occluded by fecal material within them, and in a minority of cases, diverticulitis ensues. In the presence of actual inflammation, there is a distortion of the mucosal pattern and the lumen may be narrowed and the configuration irregularly serrated; usually there is considerable irritability in the involved segments and normal pliability and mobility are lost.

E. Tuberculosis.

Primary tuberculosis of the intestinal tract may occur in children by infection through milk carrying the bovine type of bacilli, but the great majority of cases are secondary to pulmonary tuberculosis. The process usually begins in the ileocecal region with initial involvement of the lymphoid follicles and subsequent circumferential extension. In the early stage of superficial ulceration, the most

striking roentgen finding is the extreme irritability of the ileocecal region and the cecum may not be visualized (Stierlin's sign). Mass peristaltic rushes may be observed. Irregular narrowing of the terminal ileum is usually demonstrable in this stage. When the process is hyperplastic, persistent deformities may develop with shortening and irregular narrowing of the cecum, and deformity of the ileocecal valve and terminal ileum. Frequently the process is extensive and involves much of the ascending colon. Fistulous tracts may develop.

F. Lymphogranuloma Venereum.

Lymphogranuloma venereum is a specific venereal disease of virus etiology and characterized by a transient primary lesion on the genitalia and subacute or chronic regional lymphadenopathy. Subsequent involvement of the anorectal and pelvic lymph nodes, usually in females, leads to lymphatic occlusion with resultant ulceration, elephantiasis, fistula formation and stricture of the rectum. Barium enema examination reveals a long, irregular and tubular narrowing of the anorectal region which is frequently accompanied by single or multiple fistulous tracts.

III. Neoplasms.

A. Benign Lesions.

Benign tumors of the colon, other than polyps, are uncommon and include fibroma, myoma, lipoma, adenoma, angioma, papilloma, adenomyoma and carcinoid. Best demonstrated by a double contrast enema, the essential roentgen finding is a rounded, translucent area of well-defined contour within the confines of the colon. Not infrequently these lesions are associated with intussusception.

Polyps are the most common benign tumors of the colon, and consist of a stalk derived from submucous fibrous tissue and of an epithelial layer continuous with the mucosa of the colon. Practically the entire colonic mucosa may be involved, but only a single polyp is present in about half the cases. Nearly 50 per cent of the lesions occur in the rectum and sigmoid, although any portion of the colon may be involved. Roentgenograms made after double contrast studies of the colon reveal small, rounded, translucent areas attached to the wall of the colon by a stalk of variable length. One of the important factors in this disease is the familial predisposition to the development of polyps, particularly in cases of diffuse polyposis. In cases of familial diffuse polyposis, most surgeons perform ileosigmoidostomy or ileoproctostomy after fulguration of the rectal polyps. It is generally agreed that all polyps should be

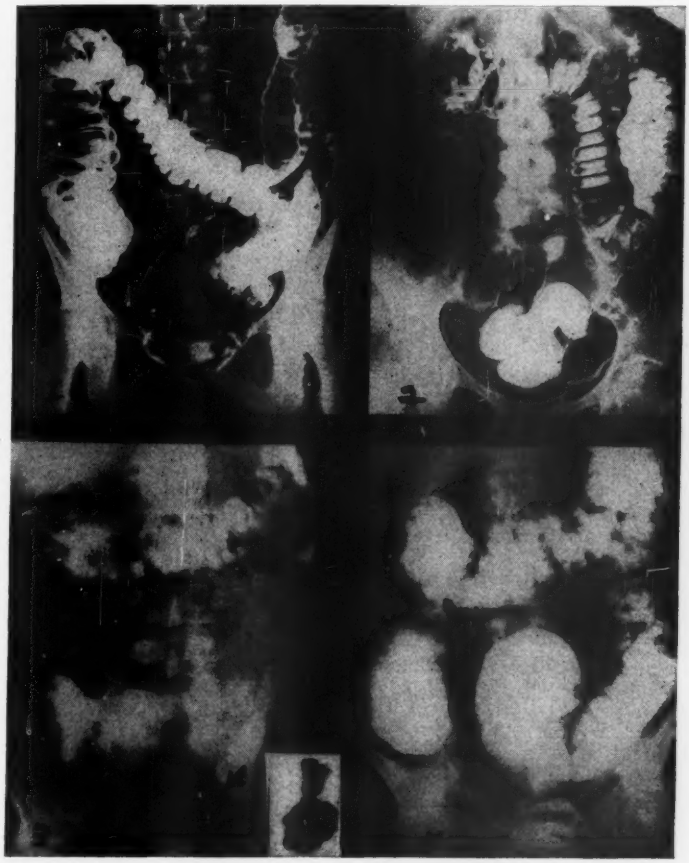

Fig. 2. (1), (2), (3) Polyps demonstrated by the double contrast technic. Malignant degeneration was present in the lesion demonstrated in No. 2. (4) Diffuse polyposis. Several members of the patient's family showed similar lesions.

removed because of their known propensity to undergo malignant degeneration.

B. Malignant Lesions.

Well over half of the carcinomas of the colon occur in the rectum and sigmoid. Scirrhous carcinoma produces an annular, sharply delineated area of narrowing of the colon and is apt to produce obstruction relatively early. Polypoid carcinoma is usually a cauliflower-like growth protruding within the lumen of the bowel and is more likely to be accompanied by bleeding, ulceration and slough-

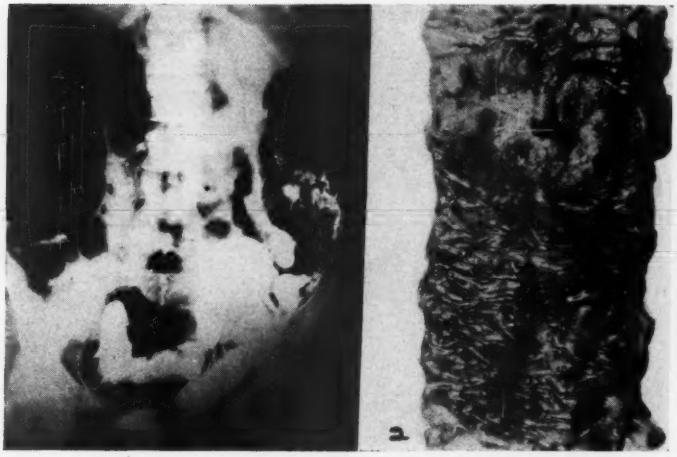

Fig. 3. (1) Irregular, polypoid filling defect of descending colon demonstrated by double contrast enema. (2) Surgical specimen: Polypoid adenocarcinoma.

ing with relatively late obstruction. In both types and in various gradations between them, there is characteristically (1) destruction of the normal mucosal pattern, (2) a comparatively short area of involvement, and (3) rather sharp delineation from the normal colon. Fistulas are common. Multiple carcinomas may be synchronous or metachronous and a patient with a cancer is more susceptible to the development of a second than one who is free of cancer. Moreover, about one third of patients with multiple colonic cancers have concomitant polyps. So it is essential that patients known to have polyps or malignancies be carefully examined preoperatively for the possibility of multiple lesions and be closely followed after operation.

Other less common malignant lesions of the colon include lymphosarcoma, leiomyosarcoma and Hodgkin's granuloma. The lesions very in type and present no distinguishing radiologic features. A specific roentgenologic diagnosis of these tumors is usually impossible, but x-ray examination is indispensable for determining the presence, location, and nature of the lesion and permanently recording the original involvement for the evaluation of progression or regression at subsequent examinations.

IV. Extracolonic Lesions with Secondary Involvement of the Colon.

Enlargement of abdominal viscera such as the spleen may displace the colon without producing compression or deformity.

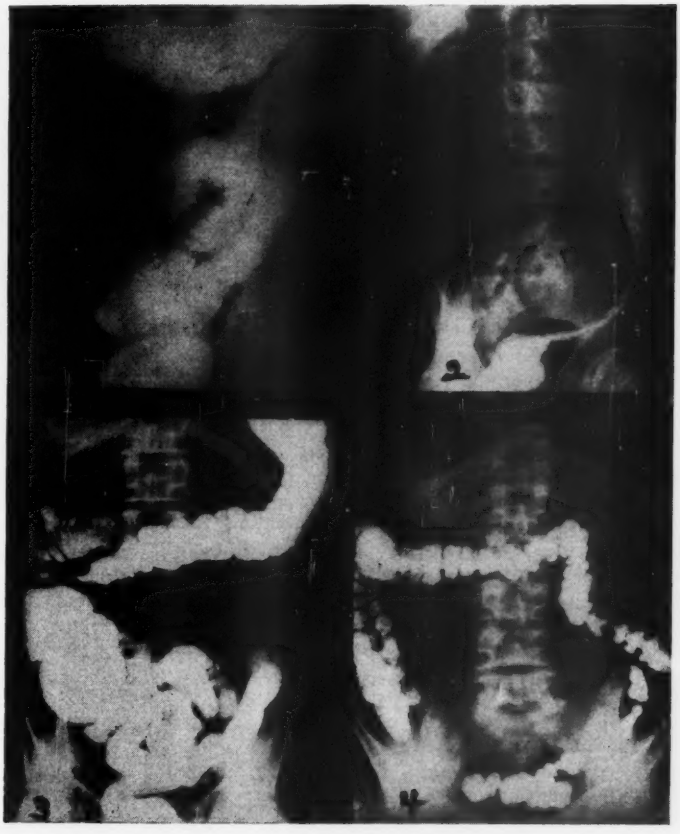

Fig. 4. (1) Compression and constriction of sigmoid as well as some displacement of the terminal ileum due to a periappendiceal abscess. (2) Compression and displacement of sigmoid due to periappendiceal abscess. Mucosal pattern is normal. (3) Extrinsic deformity of transverse colon due to large inflammatory mass surrounding a carcinoma of the gallbladder. (4) Displacement without deformity of the colon secondary to splenomegaly.

Smooth tumor masses such as a retroperitoneal tumor, a fibroid uterus, a pelvic abscess or an ovarian cyst compress the bowel, but do not constrict it; roentgenologically, the area of compression is smooth, shows intact mucosal pattern and merges gradually with normal bowel. On the other hand, pelvic inflammatory disease, endometriosis, metastatic carcinoma, adenomyosis, radiation fibrosis and extension from carcinoma of the uterus may produce distortion of the mucosal pattern as well as displacement and compression of the colon. In some such cases, it may be difficult or impossible to distinguish the lesions from intracolic disease.

A study of the more common non-obstructive lesions of the colon has been made with a discussion of the etiology, roentgen findings and therapy.

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THE BILOXI MEETING IN RETROSPECT

With pleasant memories, the Biloxi meeting of The Southeastern Surgical Congress has been recorded in the annals of history. As a refresher course for surgeons in all the specialties, it was a tremendous success. A high-water mark was reached in providing inspiration and information. This sentiment was expressed by men in every age group. There was never a dull moment, and the program was carried through in an excellent manner. Dr. Gilbert Douglas, the President, opened and closed all the meetings on time. Dr. Murph Snelling, General Chairman, was the "spark plug" of the hosts, and with the aid of his able committees, left nothing undone. Exhibitors were there in abundance, displaying their products in an educational and attractive fashion.

Some years ago, while President of the Congress, the late and beloved Dr. John Darrington urged the Congress to convene in his state. At that time, hotel facilities and auditorium and exhibit space were not available. Dr. John stated that Mississippi would build a hotel suitable for the occasion. His dream was realized when the Buena Vista, the headquarters of the Congress, added a large auditorium, air-conditioned and adapted to the needs of all.

Other hotels along the Gulf Coast were most cooperative in caring for the needs and comfort of the attending doctors and their wives.

The occasion was a delightful one from every standpoint. The weather man was on his good behavior, bringing cool breezes and bright sunshine. The golf courses were smooth and the greens well kept. Sightseeing boats were available and the sailing was good. Bathing beaches were plentiful, and all who brought splashing suits agreed that the water was fine. The doctors along the coast cities, especially those of Biloxi and Gulfport, were gracious hosts, making everyone feel at home. The profession of Mississippi turned out in large numbers, adding greatly to the success of the meeting. The ladies' entertainment committee, led by charming Mrs. Murph Snelling, were untiring in their efforts to make the visiting ladies comfortable. Teas, parties and scenic drives were provided for their pleasure.

Dr. Snelling extended to the Congress a cordial welcome, and Dr. Gus Street, Chairman of the Mississippi chapter of the Congress, extended greetings on behalf of his colleagues.

The Convocation exercise was most impressive. Two hundred forty-nine Fellows were initiated into the Congress. Secretary Beasley presented the initiates to President Douglas, who conferred the Fellowships. The convocation address was made by the Hon. Martin V. B. Miller, Chairman of the Board of Trustees of the Institutions of Higher Learning in the State of Mississippi. He spoke feelingly of the responsibility of the medical profession in this hour of threatened invasion by governmental agencies. As a layman, he warned against the socialistic trends now appearing on the horizon, making ready to invade the sacred province of private medical practice. He pointed out that the strongest bulwark against socialized medicine is the confidence of the public in the doctors, and that to hold this confidence, the doctors must *stay close to the people* and *keep secure the doctor-patient relationship* which has always been such a vital element in medical progress. He prophesied that the doctors of Dixie would be the last to give over to bureaucratic efforts to subsidize medical practice and urged that the members of The Southeastern Surgical Congress stand together as one man in the fight against such efforts.

The scientific program comprised 43 papers. The Program Committee had used the group idea in a symposium arrangement. Papers relating to surgery of the gallbladder and bile ducts were presented the first morning. The speakers, all men of wide experience, reported a wealth of interesting material from their personal practices, using slides and movies in illustration. A similar plan was followed in the afternoon, the discussion dealing with surgical dis-

eases of the stomach, duodenum and colon. The papers on surgery of the cardiovascular system and allied subjects were especially interesting, in that the authors spoke convincingly and optimistically on various phases of the newer surgical approach to this broad field. Thoracic surgery, neurosurgery, orthopedics, urology, gynecology and anesthesia were well covered by competent men in these branches. Reconstruction, rehabilitation and plastic procedures were prominently and ably discussed. Many of the best papers were given on the fourth and final day, by outstanding men in the fields of pathology, pharmacology and biochemistry.

A notable contribution was made on "The Research Program of the Medical Division of the Oak Ridge Institute of Nuclear Studies." The Institute is located in the territory of The Southeastern Surgical Congress, in easy reach of the Fellows. The enlistment and cooperation of the membership was encouraged in the use of nuclear substances in research and actual treatment of disease, especially that of a malignant nature. It was requested that only cases of some promise be referred, the advanced cases being withheld, for obvious reasons.

Four speakers on the program came from across the "Father of Waters." These four, representing the great Southwest, were among the top-ranking members of the newly organized Southwestern Surgical Congress. Fellows of The Southeastern Surgical Congress are looking with interest toward the first meeting of the Southwestern Surgical Congress at the Shamrock Hotel, in Houston, Texas, September 26-28, 1949. They extend to the Western group cordial greetings and good wishes for a successful meeting. The ties that bind together all Southern surgeons are beautifully manifested by this wholesome and cordial East-West relationship.

Before closing this, the seventeenth annual session of the Congress, the newly elected officers were installed. Dr. R. J. Wilkinson, of Huntington, West Virginia, took over the gavel as President for 1949-1950, and Dr. C. C. Howard, of Glasgow, Kentucky, was made President-Elect. Dr. Joseph S. Stewart, of Miami, Florida, was chosen Vice-President. Dr. B. T. Beasley, of Atlanta, was re-elected Secretary-Treasurer.

The Council accepted the invitation of the newly acquired group from Maryland and the District of Columbia, and the Congress will hold its next meeting at the Shoreham Hotel, in Washington, on March 6, 7, 8, and 9, 1950. When the Fellows arrive in the Capital City, the private practice of medicine will still be free from government control. Let's see to that!

R. L. SANDERS, M.D.

Memphis, Tennessee.

BOOK REVIEWS

The Editors of THE SOUTHERN SURGEON *will at all times welcome new books in the field of surgery and will acknowledge their receipt in these pages. The Editors do not, however, agree to review all books that have been submitted without solicitation.*

OPERATIVE SURGERY, by FREDERICK C. HILL, M.D., Associate Professor of Surgery, The Creighton University School of Medicine, Omaha, Nebraska, with a Foreword by CHARLES W. MAYO, M.D. New York: Oxford University Press, 1949. 712 pages with 255 illustrations. Price $12.75.

This 698 page text is designed for the intern, resident and less experienced surgeon. As the author states in his preface, his objective has been "to provide a single volume work on general surgery in which the gross appearance of surgical lesions is described, the proper treatment is indicated, and detailed description of operative procedures is given. Except for the notes on preoperative and postoperative care, this is purely an operative surgery."

The operations and technics described are those that the author has found to be the most satisfactory in his own experience in general surgery. In a number of instances his views conflict with those of most teaching surgeons. For example, he uses toothed Oschsner hemostats to clamp skin vessels, and he uses triple dye composed of crystal violet, brilliant green, and neutral acriflavine on burns on the trunk. He states that it is not his custom to use nonabsorbable suture material as a matter of routine, but rather to reserve it for those operations in which a strong wound is necessary in the interval between the absorption of the catgut and the healing of tissues.

As would be necessary in a book of this length which covers as much material as this one attempts to do, the operative procedures are not described in great detail, and in most instances only one procedure is given for each operation; however, the format of the book is excellent and the illustrations, while not extremely detailed, are clear and well drawn.

SOUTHEASTERN SECTION, AMERICAN UROLOGICAL ASSOCIATION

At the recent annual meeting of the Southeastern Section of the American Urological Association, the following officers were elected:

Dr. James J. Ravenel, President
Dr. Edgar Burns, President-Elect
Dr. Russell B. Carson, Secretary-Treasurer

At this meeting there were as guest speakers on the program:

Dr. Charles Higgins, Cleveland, Ohio
Dr. Joseph F. McCarthy, New York, N. Y.
Dr. George Prather, Brookline, Mass.
Dr. Reed M. Nesbit, Ann Arbor, Michigan
Dr. Edward N. Cook, Rochester, Minnesota